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ABSTRACT

An experimental design with experimental and control groups was used to evaluate the effect of a diagnostic structured kindergarten program upon the predicted reading levels of low income area children. The effect was compared with the effect of the traditional kindergarten program. The effects of the two curricula upon the total group of children in each curriculum, and upon the subgroups of Predicted Reading Level-Failure children were compared. The Jansky Predictive Index of Reading Performance was used as a criterion measure, and the Illinois Test of Psycholinguistic Abilities was used for diagnosis. The data analyses showed the diagnostic program to be superior to the traditional curriculum in raising predicted reading levels of the total groups of children and the Predicted Reading Level-Failure subgroups. (Author/RG)

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AN INVESTIGATION OF THE EFFECTS OF A DIAGNOSTIC PRESCRIPTIVE KINDERGARTEN PROGRAM ON THE PREDICTED READING LEVELS OF CHILDREN IDENTIFIED AS POTENTIAL READING FAILURES

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PREFACE

The authors wish to thank the administrators of the Altoona Area School District for their cooperation during this study. Special appreciation is extended to Dora Korb, Lila Winder, Katherine Everts and Margaret Craig, the teachers who participated in the study. The classroom observations could not have been completed without the efforts of Patricia Mull. Editorial help from Grace Laverty was instrumental in the completion of the final report.

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CHAPTER I

INTRODUCTION

Background of the Study

One of the most urgent problems facing the American educational system today is that of the illiterate--the nonreader. This problem was clearly stated by James E. Allen, Jr., in an address delivered before the 1969 annual convention of the National Association of State Boards of Education in September 1969. The shocking facts pointed out by Mr. Allen were:

--One out of every four pupils nationwide has significant reading deficiencies.

--In large city school systems, up to half of the pupils read below expectation.

--There are more than three million illiterates in our adult population.

--About half of the unemployed youth in New York City, ages 16-21, are functionally illiterate.

--Three-quarters of the juvenile offenders in New York City are two or more years retarded in reading.

--In a recent U.S. Armed Forces program called Project 100,000, 68.2 per cent of the young men fell below grade 7 in reading and academic ability.

The tragedy of these statistics is that they represent a barrier to success that for many young adults produces the misery of a life marked by poverty, unemployment, alienation and, in many cases, crime.

The target of any program focusing on the prevention of this tragedy must be the in-school population. At the present time, most school systems provide remedial reading programs for disabled readers; however, 85 per cent of these remedial reading programs are not available until the child reaches the intermediate grade levels. Reading disability does not occur spontaneously at this level; it is a cumulative deficiency that begins with early school experiences. This cumulative deficit of reading skill is especially prevalent in the urban, lower socioeconomic child. Reading failure in these children is 4 to 10 times more prevalent than in other school groups. According to Frost and Hawkes (1966) more than a million children start school each fall in this country so disadvantaged that failure is a natural consequence.

The solution to the problem of nonreaders in our society must involve this population of underdeveloped children. They start school with a disadvantage, and unless something is done in time to assist them, this disadvantage deepens with time. The differences in ability between the low socioeconomic child and the middle class child are largest in those factors most relevant to success in reading.

A program for the prevention rather than remediation of reading deficit is needed to enable this group of children to develop their abilities to meet the learning tasks of any reading program. Such a preventive program must begin at the kindergarten level or earlier to be effective.

Purposes and Objectives

The major purposes of this study were to identify those children in a low income area who would be classified as high-risk in future reading achievement and to provide a structured training program in kindergarten, designed to develop the conceptual competencies and cognitive skills necessary for success in "reading readiness" activities provided in 1st grade. A change in the predicted reading levels of the children was the expected outcome of such training.

The major objectives of this study were:

(1) to assess the success of a diagnostic, structured kindergarten program in raising the predicted reading levels of urban kindergarten children identified as potential reading failures.

(2) to compare the effects of this diagnostic, structured kindergarten program with the effects of a traditional kindergarten program upon the predicted reading levels of these children.

Hypotheses

The primary hypotheses of this study were:

(1) a diagnostic, structured kindergarten program will significantly raise the predicted levels of reading achievement of children identified as potential reading failures.

(2) in working with children identified as potential reading failures the diagnostic, structured program will raise their predicted reading levels significantly more than will a traditional kindergarten program.

Review of Related Literature

The reading process is not prone to the Gestalt, sudden illumination type of learning process. The ability to read does not spring full-grown in 1st grade. Reading is a complex skill, based upon a number of correlated factors. It is an expansion of abilities acquired gradually rather than an abrupt step upward.

The existence of separable and independent perceptual, motor and cognitive competencies prerequisite to acquisition of reading competency is implicit in much that is written about reading. De Hirsch, Jansky and Langford (1966) have identified a distinct perceptual, motor and oral language pattern at kindergarten age that is related to reading levels at the end of 2nd grade. The factors identified by De Hirsch and Jansky as significantly associated with later performance in reading are:

(1) presence or absence of hyperactive, distractible, uninhibited behavior

(2) fine motor control

(3) graphomotor ability

(4) human figure drawing (body image)

(5) visual-motor integration

(6) receptive language skills

(7) expressive language

(8) visual perception

(9) integration of intersensory information

(10) ego strength and work attitude

A later longitudinal study by Jansky (1970) involving a heterogeneous sample of 401 urban children supports the relationship of several of these independent kindergarten abilities to 2nd grade reading achievement. Twenty tests were administered to the subjects in kindergarten and in 2nd grade. Factor analysis yielded five factors at the kindergarten level that were related to 2nd grade reading achievement. The five factors were: Visual-motor Integration, Oral Language A, Pattern Matching, Pattern Memory and Oral Language B. Oral Language A was most closely related to the greatest number of reading and other language arts activities. The research studies of Lovell and Gorton (1968) and McCleod (1967) report similar factor patterns which relate to reading performance.

Recent research studies confirm the validity of the relationship of these factors to reading achievement. Rabinovitch (1962) and Anderson and Samuels (1970) show that visual recognition is an important factor in reading and disabled

readers are deficient in this area. The relevance of the integration of intersensory information to the reading process is supported by the findings of Birch and Belmont (1968). Dykstra (1966) found a significant relationship between prereading auditory discrimination skills and future reading ability. The research findings of Ruddell (1968) indicate a relationship between expressive and receptive language skills and a child's success in reading.

The research cited supports the assumption that a child must achieve competency in certain areas if he is to achieve mastery of the reading process. Special training in areas of deficiency is indicated. Many research studies indicate that diagnostic training programs at the kindergarten level will remediate deficiencies in many of these factors.

Faustman (1968) found that kindergarten lessons in perceptual training had positive effects on 1st grade reading achievement. McCormick, Schnobrich and Footlik (1969) found that gross motor training affected the reading scores of the lower third of a 1st grade class. The work of Hayes and Dembo (1970) indicated that a diagnostic-prescriptive program effected a significant improvement in the developmental language of pre-schoolers.

Research clearly indicates that factors related to reading achievement can be identified and that deficiencies in these factors can be modified by early detection and structured training.

A survey of research concerned with the disadvantaged child reveals the prevalence of deficiency in the very factors identified as related to reading achievement. The environmental milieu of the educationally disadvantaged child does not provide opportunities to adequately develop the factors related to the reading process. The deficiencies of disadvantaged children in linguistic, cognitive and perceptual abilities limit their ability to develop early reading skills (Chandler, 1966). The greatest single factor contributing to the lower performance of deprived children appears to be the direct result of language deficit. Both their receptive and expressive language functions need to be stimulated (McConnell, 1969).

Studies by Bruininks (1969) and Clark and Richards (1966) found that children of low socioeconomic status were consistently inferior to middle class peers in auditory skills, auditory discrimination, auditory memory, and sound blending. They lack the auditory-receptive and language abilities necessary to cope with reading materials.

Reissman (1962) specifies the following characteristics of the disadvantaged child: language inadequacies, limited vocabulary and syntactical structure, inability to manage abstract symbols and complex language forms and to interpret and communicate, difficulties in developing and maintaining thought sequence verbally, unfamiliarity with formal speech patterns, reliance on nonverbal communication

means, perceptual deficiencies, problems of visual and auditory discrimination and spatial organization. Deutsch (1963) found that the auditory and visual perceptions of these children are unorganized and restricted.

Reading is the process of translating graphic symbols on a printed page into meaningful communication. If a child is to become competent in this translation, he must have the ability to visually discriminate one printed letter from another, to associate these graphic symbols with certain phonemic elements, to blend these phonemic elements into a recognizable template that exists in his expressive or receptive vocabulary, and to associate this template with a nonarbitrary referent that has been established within the cognitive space of the child.

The factors necessary for successfully mastering the beginning reading process have been specified in the research cited. If a child is identified as deficient in any of these factors, he will not achieve mastery of this reading process. Special training in areas of deficiency is indicated.

Although research has identified factors highly correlated with reading achievement and has shown that training can modify deficiencies in these factors, there are no studies that show that this knowledge has been used to effect a change in predicted reading levels of potential reading failures. The present study utilized a structured training program in kindergarten designed to develop the conceptual competencies and cognitive skills necessary for success in "reading readiness" activities provided in 1st grade.

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CHAPTER II

PROCEDURES

The experimental design required the location of a school district and the selection of a sample population for the implementation of the study. In addition, measurement instruments and testing personnel were needed. It was necessary to locate classroom materials for the Kindergarten Diagnostic Prereading Program (Kidi-Prep) curriculum and to provide prestudy training in the use of Kidi-Prep for the teachers.

The procedures used in the implementation of the study will be described in this section. In addition to the activities named above, the classroom observations will be described.

Sample

After considering several locations, the decision was made to implement the study in the Altoona Area School District. Other cities that had been considered were Harrisburg, Lancaster, Pittsburgh and Philadelphia. These locations were rejected for various reasons which would have limited generalization to other populations. The Harrisburg schools have four-year-olds in public school prekindergarten classes and this is unique to Harrisburg; Lancaster has a large number of Spanish-speaking children and bilingualism would have introduced an additional variable into the study; and any results from either Pittsburgh or Philadelphia could be generalized only to the city in which the study was done.

Altoona is representative of many small cities. The area is one of high unemployment with large numbers of poverty and near-poverty families located in pocket areas surrounded by middle-class neighborhoods. The children from these poverty areas attend neighborhood schools until they reach junior high school. At this time they are thrust into competition with children from more affluent areas.

The Altoona area has a high incidence of school dropouts and a functional illiteracy rate of 4 per cent according to the 1969 census. The city is the center of Blair County and approximately one-half the county population resides in Altoona. The city's population is 62,900. During 1972 the rate of unemployment was 7.5 per cent, the average annual salary for an industrial worker, according to 1970 data, was $5,935 and the average value of homes was $5,900. According to 1971 manpower data, 52 per cent of the individuals in the population considered were at the disadvantaged poor or near-poverty levels. (Pennsylvania Department of Commerce, 1970)

On the basis of this information, the Altoona Area School District met the criterion of high incidence of poverty and near-poverty level children who are likely to have difficulty in early school experience.

The racial balance in the Altoona Area School District is similar to the majority of the school districts in Pennsylvania. Ninety-five per cent of the black school population are concentrated in 14 counties of the state. In most of these counties the proportion of nonwhites in the school population ranges from 0 per cent to .4 per cent. In the Altoona Area School District the school population of blacks is .1 per cent of the total school enrollment. Since this percentage falls within the range typical of most of the schools in Pennsylvania and because race was not one of the pertinent variables being considered, this proportion was accepted as adequate for the purpose of this investigation.

Two schools within the Altoona district were selected to participate in this study on the basis of the following criteria: (1) the school population was drawn from an attendance area characterized by lower socioeconomic families, (2) the past school records show that the median reading level at the end of 2nd grade was below the district median for that grade, (3) the number of retentions in the school was a minimum of five steps above the district median number of retentions per school and (4) the school had two kindergarten classrooms and two kindergarten teachers. Table 1 shows the school values for each criterion.

Table 1

Criteria for Participation

Criteria	District Value	School A	School B
Percent Low SES*	16%	73%	72%
Median Reading Level at End of Grade 2	3.0	2.7	2.6
No. of Retentions in 1971	7 (median)	12	22

*Based on Father's Occupation

One hundred ninety-six kindergarten children were assigned to classes within School A and School B, using the following systematic randomization process. Children were assigned to the school buildings by attendance areas (they attend the building closest to their homes). The children were assigned to teachers

within each school on an alternate basis as the parents enrolled them, i.e., the first child enrolled in School A was assigned to Teacher 1; the second to Teacher 2; the third to Teacher 1, etc. The first 25 children assigned to each teacher attended the morning kindergarten session, the remainder of the children attended the afternoon session. Parents could enroll children at any time that they chose during a three-day enrollment period.

Although total randomization using the table of random numbers would have been preferable in assigning children, this was not possible. The above randomization process was acceptable on the part of the district and a feasible alternative to the usual randomization process.

Classes were randomly assigned to experimental and control conditions using a table of random numbers. Because teachers were crossed with treatments, when one of a teacher's classes had been assigned to a treatment, her other class was automatically assigned to the other treatment.

The sampling technique described above provided four classes in School A and four classes in School B. Two teachers in each school taught two daily sessions of kindergarten. One of these sessions used the diagnostic curriculum; the other session used the traditional curriculum. The total sample involved two schools, four teachers, four experimental and four control classes. (Figure 1)

		Diagnostic	Traditional
School A	Teacher 1	a.m.	p.m.
	Teacher 2	p.m.	a.m.
School B	Teacher 3	a.m.	p.m.
	Teacher 4	p.m.	a.m.

Figure 1

Assignment of Classes to Treatments

Experimental Design

This study used two basic designs. The Solomon Four-Group Design described in Campbell and Stanley (1966, p. 24) was used to determine if there was an effect of pretesting or an interaction of treatment and pretesting. This design is shown in Figure 2.

	Treatment	Control
Pretested	12	12
Unpretested	12	12

Figure 2

Solomon Four-Group Design

Three subjects were randomly selected from each cell (Figure 2) and were not pretested, providing 24 subjects for the unpretested cell. After the posttesting, three subjects were randomly selected from each cell who had received both pre- and posttest. This sample of 48 subjects was used in the analysis of data for the Solomon Four-Group Design.

The overall design of the total study was a 2 x 2 x 4 factorial design with two levels of treatment, two levels of school and four levels of teachers. (Figure 1)

Instrumentation

The Jansky Predictive Index of Reading Performance was used as pre- and posttest to determine predicted reading levels. This instrument is a refinement of the De Hirsch Predictive Index (De Hirsch, 1966) and is the result of a four-year longitudinal study by Dr. Jeannette Jansky (1970). Dr. Jansky administered tests to kindergarten children and then measured the reading achievement of the same children at the end of 2nd grade. Through the use of multiple correlation and step-wise regression analysis, a battery of five tests was selected. This battery of tests successfully predicts at kindergarten level whether a child will succeed or fail in future reading achievement. This prediction was found to be accurate 75 per cent of the time.

The subtests in this battery and the zero order correlation coefficients with reading achievement are:

Test	Correlation Coefficient with Reading Performance
Letter Naming	.54
Picture Naming	.43
Sentence Memory	.38
Gates Matching	.37
Bender Visuo-Motor	.31

There are two forms of the Jansky index: Form A for Negroes, Puerto Ricans and white boys; and Form B for white girls. Sample items for the subtests are included in Appendix A-1, page 43. A score of < 50 on the Jansky index was considered as predicting reading failure; a score of $\geq$ 50 was considered as predicting future success in reading.

The Illinois Test of Psycholinguistic Abilities (ITPA) was administered to children identified by the Jansky index pretest as potential failures. The results of the ITPA provided a diagnostic profile of specific areas of need for each child. These profiles were used as a basis for within class grouping for instruction.

The ITPA has been standardized and language age norms, standard score norms and total score standard norms are provided. Internal consistency coefficients for subtests over all age levels range from .90 to .95. The test-retest stability coefficient for the total test is .97. Several studies indicate the acceptability of the ITPA as a diagnostic instrument. Sample items from the ITPA are included in Appendix A-2, page 44.

An observation scale, Kindergarten Observation Record for Language Arts (KORLA), was constructed for use by raters during the classroom observations. This scale was devised using the Observation Schedule and Record (Medley, 1958) as a model. The KORLA records teacher behavior under 13 categories related to the areas specified in the ITPA. Pupil responses elicited by specific teacher behaviors are also recorded. Interrater reliability was computed on data collected during five classroom observations. The interrater reliability was .95 on teacher behaviors recorded and .92 on pupil responses recorded. As the reliabilities were acceptable for the purposes of the study, KORLA was used for all classroom observations. A sample of KORLA is included in Appendix A-3, page 45.

Analysis of Data

The data from the Solomon Four-Group Design were analyzed using a 2 x 2 analysis of variance (Winer, 1963, p. 228). To test the effects of Kidi-Prep upon predicted reading levels a test of the difference in sample proportions was used.

The data collected to compare the two treatments for the total study were analyzed using analyses of covariance (Winer, 1963, p. 595), with the Jansky pretest scores as the covariate measure and the Jansky posttest scores as the criterion measure.

The data collected from the classroom observations were analyzed and descriptive statistics based upon frequency count were computed.

Description of Treatments

Kidi-Prep. The experimental curriculum entitled Kindergarten Diagnostic Prereading Program followed the Hartman model for a Diagnostic, Prescriptive Kindergarten Program (Hartman, 1966). Teachers were provided with a diagnostic profile for each child who had been identified by the Jansky index as a potential reading failure. The diagnostic profiles were derived from the children's scores on the various subtests of the ITPA.

The teachers used the diagnostic profiles to group children within the class for instruction. Each classroom had three or four instructional groups of children ranging in number from 6 to 8. The teachers had the option of forming instructional groups of children with a range of problems or with similar problems. All four teachers assigned the children with diagnosed areas of need together, and maintained these intact groups for the entire school year. Therefore, variation in instructional grouping was not considered in the data analysis.

Four centers were established in the Kidi-Prep program classrooms. The first center focused on materials and activities which required visual motor association on the part of the child, e.g., cutting out pictures of household items and then categorizing them on various criteria such as function, color, shape, etc. The second center focused on materials and activities which required visual decoding and visual motor sequencing, e.g., following a pattern and stringing beads in the proper sequence of shape and color represented in the pattern. The third center focused upon auditory and visual activities, e.g., the children were shown an item and asked to describe it or were asked to identify specific attributes verbally. The fourth center focused upon auditory and verbal activities which involved auditory reception and perception with verbal interaction, e.g., the teacher presented verbal information related to a visual presentation and the children were required to integrate both auditory and visual information and respond verbally.

The Kidi-Prep instructional period was divided into four segments approximately 15 minutes long. The instructional groups of children moved from one station to the next station at the end of each of the 15-minute time segments. This provided daily experiences in all areas specified for each small group of children. Each group was involved in one segment at a teacher-directed station; the other three stations were either independent learning situations or student-directed.

Materials were provided for the teacher-directed centers. These materials were the first five kits of the Cemrel Learning and Thinking packages. These materials are described in Appendix B-1, page 53. The Cemrel materials are designed to develop a child's capacity to infer from experiences and from observations of concrete objects, to learn to discriminate among similar objects on the basis of critical features, to classify and categorize on several criteria, and to determine class inclusion by negation, e.g., a class may include everything that is not red. These materials also provide a basis for

expanding the receptive and expressive vocabularies of the children. The teacher-directed center was characterized by direct, highly structured activities with specified criterion behaviors expected from the children. The lessons were structured to combine concept formation and vocabulary expansion. The tasks associated with concept attainment and the language skills developed throughout the program are found in Appendix B-2, page 66.

The independent and student-directed activities at the other three stations used the kinds of materials found in most kindergarten classrooms. However, the activities planned for these stations were structured to provide opportunities for the expansion of the skills developed at the teacher-directed station and to provide opportunities for the conscious application of the cognitive processes elicited by the activities at the teacher-directed station. Typical schedules and activities are outlined in Appendix B-3, page 68.

Traditional Kindergarten Program. The Pennsylvania Department of Education (1968) provides the following description of a typical kindergarten:

> Today, most people recognize that kindergarten IS school and they appreciate the fact that even at the age of five, great things are already happening. Not only a laboratory for social development with lessons in cooperation, tolerance, self-control and citizenship, the kindergarten is a workshop in which the basis for all future academic growth is laid.
>
> To designate exact allotments of time for every kindergarten to follow is neither wise nor possible. For this reason several types of daily schedules are proposed that may be adapted easily to individual tastes and needs. Each one is semi-structured and is subject to change at the discretion of the teacher. Each one outlines general blocks of time yet provides for alternating quiet and active periods and a balance of indoor-outdoor experiences (Appendix B-4, page 75).

In-service Training Session

An in-service workshop for the participating teachers was held before the start of the 1971-72 school term. The workshop ran for five days with two sessions each day. A general overview of the Kidi-Prep project was provided for the teachers during the orientation phase of the workshop. Methods of informal classroom diagnosis were discussed and the teachers developed a checklist for informal diagnosis of readiness areas.

A demonstration of the Language and Thinking materials was held with a group of five-year-old children and sample kits of these materials were available for the teachers to examine and manipulate. During the latter part of the workshop, the teachers were given simulated ITPA profiles for a class, and using these profiles the teachers planned instructional grouping and activity schedules for a typical school week in a Kidi-Prep classroom. The schedule for this workshop can be found in Appendix C-1, page 80.

Testing

Testing personnel were six doctoral candidates from the School Psychology Department, College of Education, The Pennsylvania State University, who had completed extensive training in psychological testing.

The pretest administration of the Jansky index was completed during the last two weeks in September. The ITPA was administered during the first two weeks in October to all children in Kidi-Prep classes scoring less than 50 on the Jansky for diagnostic purposes. All of the tests were individually administered, requiring 30 minutes per child for the Jansky index and approximately one hour per child for the ITPA.

The posttesting using only the Jansky index was completed during the last week of April and the second week in May. Children who were absent during these periods were tested during the third week in May.

Activities during the Project

Implementation. The Kidi-Prep program was introduced into the experimental classrooms during the third week in October. The first two weeks were spent in establishing instructional groups and in familiarizing the children with the procedures involved in working at the various centers and in rotating from one center to the next. Actual classroom use of the materials and teacher guides provided began on November 1, 1971 and terminated April 21, 1972, a total of 24 weeks.

Classroom Observations. Classroom observations were scheduled biweekly for both the Kidi-Prep and traditional kindergarten classrooms. This schedule was adhered to as closely as possible, with some variations necessitated by weather conditions and school holidays. Each of the eight classrooms was observed 10 times during the project. The KORLA scale was used to record teacher and pupil behaviors during the observation periods. The classroom observers were the director and field director of the project. Both observers completed practice observation sessions in the classrooms before the program was implemented. During the pretesting period, the observers were present in the classrooms so that the pupils were accustomed to their presence in the room. This allowed the actual classroom observations to be as unobstrusive as possible.

These regular classroom visits provided an opportunity for the teachers to discuss any problems or questions related to Kidi-Prep. Since all teachers taught in both traditional and Kidi-Prep classrooms, the observations were a method of preventing "fall-out" from the Kidi-Prep to the traditional program. It appeared to be effective in maintaining this separation of programs.

The data from these observations is presented in the next chapter. Teacher 2 in School A became ill during the project and was replaced at the end of the 10th week. The new Teacher 2 was trained in the use of Kidi-Prep by the field staff. Observation data reported for Teacher 2 were collected during observations made from the 10th week to the 24th week of the study.

CHAPTER III

RESULTS OF THE STUDY

The results of the data analyses will be presented and discussed in this chapter. First, the analysis of data for the Solomon Four-Group Design will be presented and discussed. Following this section, the analysis of data relevant to each specified objective of the study will be presented and discussed. Finally, the descriptive data collected from the KORLA scale and teacher logs will be presented and analyzed.

I. Results of the Solomon Four-Group Design Analysis

The purpose of the Solomon Four-Group Design was to determine if there was any interaction between the pretest and the treatment. If such an interaction were present, any effect of the treatment would be uninterpretable.

The sample for this analysis was 24 children who had not been pretested and 24 who had been pretested. Four children from each cell were selected randomly before the pretesting began. This provided 32 children, 16 in each treatment who were not pretested. During the study, 8 of these 32 were lost because of transfers to other schools. Before the posttesting began, 24 children who had been pretested were randomly selected, 3 from each classroom. This provided 12 subjects in each cell of the Solomon Four-Group Design and a total of 48 subjects, 24 pretested, 24 not pretested. The data were analyzed using 2 x 2 analysis of variance. The results of this analysis are shown in Table 2.

Table 2

Solomon Four-Group Analysis of Variance

Source	Sums of Squares	d.f.	Mean Square	F
Treatment	120.3333	1	120.3333	.4324 N.S.
Testing	24.0833	1	24.0833	.0865 N.S.
Interaction	4.4166	1	4.4166	.0158 N.S.
Error	12520.8338	45	278.2407	

Since the results of the analysis of data in Table 2 showed no significant interaction between the testing and treatment, the later tests of differences between the effects of the two treatments, Kidi-Prep and Traditional Kindergarten (T-K), used analysis of covariance.

II. Results for Predicted Reading Level-Failure Groups

Results Related to Hypothesis One

The first objective of this study was to determine whether or not a diagnostic, structured kindergarten program would be effective in raising the predicted reading levels of children identified as potential reading failures (PRL-F). A test of the difference between the proportion of PRL-F children in the Kidi-Prep group as shown by the Jansky index pretest scores and the proportion of PRL-F children in this group as shown by the Jansky index posttest scores was used to test this first hypothesis (Edwards, 1966). The results of this analysis are shown in Table 3.

Table 3

Proportion of Subjects Categorized as Predicted Reading Failures by Jansky Index

Treatment	Pretest	Posttest	z	Significance Level of Differences
Kidi-Prep	.63	.21	6.935	$p < .01$
Traditional	.62	.32	4.376	$p < .01$

Table 3 shows a statistically significant difference at the .01 level between the proportion of PRL-F children in the Kidi-Prep group at the beginning of the study and the proportion of PRL-F children in this group at the end of the study. On the strength of this finding the null hypothesis of no significant change in predicted reading levels of PRL-F children in the Kidi-Prep program was rejected.

Table 3 also shows that the Traditional Kindergarten program affected a significant difference in the prestudy and poststudy proportions of PRL-F children. It can be seen that the z score computed for the pre- and posttest differences in proportion in the Kidi-Prep group was higher than that computed for differences in the T-K program. The difference between the two z scores was

significant at the .053 level and did not meet the level of .050 that had been specified as the acceptable level of significance. However, this difference of .11 should be a practical consideration in planning kindergarten curricula.

Results Related to Hypothesis Two

The second objective of this study was to compare the effects of the Kidi-Prep curriculum with the effects of the Traditional Kindergarten program upon the predicted reading levels of children identified as potential reading failures. The null hypothesis tested in relation to this objective was: There will be no differences in the Jansky index posttest means between the PRL-F group of children in the Kidi-Prep curriculum and the PRL-F children in the T-K curriculum.

Test of Assumptions for Analysis of Covariance

This hypothesis was tested using factorial analysis of covariance. A computer program SCARDT1 from the Stanford Center for Research and Development for Teaching (Appendix E, page 82) was used on the IBM 360/67 computer at The Pennsylvania State University to determine whether the basic assumptions necessary for the use of analysis of covariance had been met. The results of this preliminary analysis for both the total groups and the subgroups of PRL-F children are given in Table 4.

Table 4

Results of SCARDT1 Analyses Testing Analysis of Covariance Assumptions for Jansky Index X Variable: Pretest, Y Variable: Posttest

	r_{xy}		Homogeneity of Regression of Y on X		
	Kidi-Prep	T-K	d.f.	F	
Total Groups	.618	.597	1,164	.1794	N.S.
PRL-F Groups	.362	.341	1,115	.0151	N.S.

The scattergrams generated by SCARDT1 showed a linear relationship between pretest and posttest scores for both of the total groups and for both of the PRL-F groups. The F ratios for parallelism of regression were nonsignificant for both the total groups and the PRL-F groups indicating homogeneity of regression and absence of any interaction. At least 1 per cent of total variance

should be accounted for by the coefficient correlation to justify analysis of covariance. Both of the coefficients in Table 4 meet this requirement. Since the Jansky index pretest and posttest scores were shown to have a linear relationship, homogeneity of regression without interaction and adequate correlation coefficients, the basic assumptions for the use of analysis of covariance had been met.

Analyses of Covariance for Predicted Reading Level-Failure Group

Treatment by Schools and Analysis of Covariance. A 2 x 2 factorial analysis of covariance for unequal n's was done on data for the PRL-F groups. There were 64 children in the Kidi-Prep PRL-F (Predicted Reading Level-Failure) group and 55 in the Traditional Kindergarten PRL-F group. The factors involved were two levels of treatment and the two schools. The covariate value was the Jansky index pretest score; the criterion value the Jansky index posttest score. The results of this analysis are found in Table 5.

Table 5

Treatment by Schools Analysis of Covariance
for PRL-F Groups on Jansky Index Scores

Source	Sums of Squares	d.f.	Mean Square	F
Treatments	2217.9288	1	2217.9258	10.878**
Schools	1212.5144	1	1212.5144	5.947* N.S.
Interaction	21.0617	1	21.0617	.1033 N.S.
Error	23650.829	114	203.8864	
Total	27102.334	117		

**Significant beyond .01 level
*Significant beyond .05 level

The results presented in Table 5 show a significant difference between the means of the two treatments for the PRL-F groups. From Table 6 it can be seen that the Predicted Reading Level-Failure group in the Kidi-Prep curriculum had the higher adjusted mean on Jansky index posttest. There were also significant differences between the schools and no treatment by school interaction. On the basis of these results, the null hypothesis of no significant differences between the posttest means of the Predicted

Reading Level-Failure group of children in the Kidi-Prep curriculum and the group of Predicted Reading Level-Failure children in the Traditional Kindergarten curriculum was rejected. The Kidi-Prep curriculum had demonstrated a significantly greater effect in raising the predicted reading levels of PRL-F children than had the Traditional Kindergarten curriculum.

Post Hoc Comparisons of School Means. The Tukey WSD technique for post hoc comparison of means was used to find the source of the between school differences. The results of this analysis are found in Table 6.

Table 6

Tukey WSD Results

	School A Means	School B Means	Difference
Kidi-Prep	63.78	56.60	7.18*
Traditional	54.24	48.85	5.39*

*Significant beyond .05 level

Table 6 shows that in both the Kidi-Prep and the Traditional Kindergarten curriculum School A had significantly higher mean on the Jansky adjusted posttest scores than did School B.

Treatment by Teachers Analysis of Covariance. The experimental design controlled for teacher effect by having all teachers teaching in both treatments. To check on the adequacy of this control an additional teacher by treatments analysis of covariance was performed for the PRL-F groups. The results of this analysis are found in Table 8.

Because this was a 2 x 3 factorial analysis of covariance the COV computer program required equal numbers in each cell. The randomization process was used to delete data and this analysis was done with 11 subjects in each cell. Even with this small number there were significant treatment effects. As expected, there were no teacher effects and no treatment by teacher interaction.

Table 7

Treatment by Schools: Pretest and Posttest Means and Standard Deviations and Adjusted Jansky Posttest Means for PRL-F Groups

School	Kidi-Prep -- N = 30*					Traditional -- N = 30*				
	Pretest		Posttest		Adjusted Posttest	Pretest		Posttest		Adjusted Posttest
	Mean	S.D.	Mean	S.D.	Mean	Mean	S.D.	Mean	S.D.	Mean
A	29.09	11.765	63.27	11.497	63.78	30.01	14.091	54.24	15.230	54.38
B	31.96	12.307	57.25	15.897	56.60	30.31	10.756	48.85	17.561	48.87
Total	30.27		59.77		59.79	30.41		51.98		51.95

*N = Number of children in each school; total N = 120

Table 8

Treatment by Teachers Analysis of Covariance
for PRL-F Groups on Jansky Index Scores

Source	Sums of Squares	d.f.	Mean Squares	F
Treatments	1513.9205	1	1513.9205	6.2091**
Teachers	312.1303	3	104.0434	.4267 N.S.
Interaction	309.5971	3	103.1990	.4232 N.S.
Error	19261.9280	79	243.8218	
Total	21397.5760	86		

**Significant beyond .01 level

III. Results for Total Groups

Following the completion of the analysis of data in relation to the PRL-F groups several other analyses were performed to compare the effects of Kidi-Prep upon the predicted reading levels of the total groups of children with the effects of the Traditional Kindergarten curriculum.

To meet the requirements of the use of the COV computer program that there be an equal number of subjects in each cell, data were randomly deleted. These analyses used data from 168 subjects, 21 in each classroom.

Treatments by Schools Analysis of Covariance

A 2 x 2 multiple classification analysis of covariance was used to determine if there were differences between the effects of the two treatments upon pretest predicted reading levels. Again the covariate was the Jansky pretest score; the criterion measure was the Jansky posttest score. The two factors involved were schools and treatments. Table 9 presents the results of the analysis of covariance. Table 10 shows the means and standard deviations.

Table 9

Treatments by Schools Analysis of Covariance
for Jansky Index Posttest

Source	Sums of Squares	d.f.	Mean Square	F
Treatments	1359.8082	1	1359.8082	6.9058**
Schools	1559.6047	1	1559.6047	7.9020**
Interaction	35.0690	1	35.0690	.1780 N.S.
Error	32096.0120	163	196.9080	
Total	35050.4930			

**Significant beyond .01 level

The results shown in Table 9 show a significant difference between posttest means of the two treatment groups when differences on pretest scores are controlled for by analysis of covariance. An inspection of Table 10 shows that the Kidi-Prep adjusted Jansky posttest means are higher than the adjusted posttest means of the T-K group. It appears that Kidi-Prep is more effective than the Traditional Kindergarten curriculum in improving scores on the Jansky Predictive Index of Reading Performance. This finding substantiates the results presented in an earlier section showing significant differences between the proportion of PRL-F children in the Kidi-Prep group before the study began and the proportion of PRL-F children in the Kidi-Prep group at the end of the study.

Post Hoc Comparison of Means. A significant difference between the two schools is also shown in Table 9. To determine the source of this difference a Tukey WSD procedure was used to compare the means (Winer, 1962). The results of this comparison are shown in Table 11.

Table 10

Treatment by Schools: Pretest, Posttest and Adjusted Posttest Means and Standard Deviations for Jansky Index

School	Kidi-Prep -- N = 42*					Traditional -- N = 42*				
	Pretest		Posttest		Adjusted Posttest	Pretest		Posttest		Adjusted Posttest
	Mean	S.D.	Mean	S.D.	Mean	Mean	S.D.	Mean	S.D.	Mean
A	40.262	20.54	67.119	14.32	66.673	41.571	21.62	61.214	17.62	60.057
B	36.143	15.95	57.857	19.22	59.646	39.785	17.72	55.048	18.29	54.861
Total	38.202	18.55	62.488	17.50	63.160	40.678	20.17	58.131	18.29	57.860

*N = Number of children in each school; total N = 168

Table 11

Tukey WSD Results

	School A N = 42 Mean	School B N = 42 Mean	Difference	Level of Significance
Kidi-Prep	66.673	59.646	6.927	$p < .05$
Traditional	60.057	54.861	5.196	N.S.

School A is shown to have a higher adjusted posttest mean in both the Kidi-Prep and the T-K curriculum. It appears that in School A, in either curriculum, children are doing better than are the children in School B in the areas measured by the Jansky index. However, the difference between the two schools is statistically significant only in the Kidi-Prep curriculum.

Treatment by Teachers Analysis of Covariance

To determine whether the experimental design did control for teacher effect, a treatment by teacher analysis of covariance was run. The results of this analysis are shown in Table 12. The means and standard deviations for these data are given in Table 13.

Table 12

Total Groups Treatment by Teachers Analysis of Covariance for Jansky Posttest

Source	Sums of Squares	d.f.	Mean Square	F
Treatments	1362.5982	1	1362.5982	6.9639**
Teachers	1698.9380	3	566.3126	2.8942*
Interaction	875.1759	3	291.7253	1.4909 N.S.
Error	21110.8200	159	195.6655	
Total	35047.5320			

**Significant beyond .01 level
*Significant beyond .05 level

Table 13

Treatment by Teachers: Pretest, Posttest and Adjusted Posttest Means and Stantard Deviations for the Jansky Index

Teacher	Kidi-Prep -- N = 21*					Tradi onal -- N = 21*				
	Pretest		Posttest		Adjusted Posttest	Pretest		Posttest		Adjusted Posttest
	Mean	S.D.	Mean	S.D.	Mean	Mean	S.D.	Mean	S.D.	Mean
1	43.76	19.84	66.05	15.62	63.69	37.95	21.49	61.19	18.89	62.00
2	36.76	20.34	68.19	13.04	69.65	45.19	21.48	61.24	17.27	58.10
3	32.48	13.63	52.66	19.30	56.47	42.38	17.51	57.24	16.60	55.63
4	39.81	17.84	63.05	17.37	62.85	37.19	20.17	52.86	18.29	54.08

*N = Number of children in each class; total N = 168

It is apparent from the results reported in Table 12 that there is a statistically significant difference between the two treatments, Kidi-Prep and T-K, in their effects upon the adjusted posttest means of the Jansky Predictive Index of Reading Performance. Again the Kidi-Prep adjusted posttest mean is higher than the adjusted posttest mean of the T-K group (Table 13).

Post Hoc Comparison of Means. A significant difference among teachers within treatments is also shown in Table 13. To determine the source of this difference, all possible pairs of adjusted posttest means were compared using the Tukey WSD procedure.

The only significant difference found was the 13.18 difference between Teacher 2 in School A and Teacher 3 in School B in the Kidi-Prep curriculum. This one difference was large enough to cause the significant teacher effect in the analysis of covariance results.

IV. Results of Classroom Observations

The data collected from the records of classroom observations in both curricula are presented in Appendix F, page 89. This appendix provides a description of the teacher behavior goals and the kinds of pupil responses observed within each of the eight classrooms, both Kidi-Prep and T-K.

The means and standard deviations of the number of times during an hour that teachers exhibited behaviors which required pupils to use specific cognitive processes are provided in Appendix F. The means and standard deviations of the number of times that specific pupil responses were demonstrated during an hour are also given for each classroom.

It was possible for a single activity lasting only five minutes to involve all the areas of the cognitive processes specified and many of the subcategories. Several types of pupil responses could also occur during one activity.

Since the classroom observers were in close agreement in their recording of teacher behaviors and pupil responses, data from 10 observations in each classroom were pooled for each of the treatments. The pooled data were used to compute the mean number of teacher behaviors with specific cognitive goals observed during each classroom observation. The mean number of pupil responses recorded during each classroom observation was also computed using the pooled data. (See Table 14)

Correlated t tests of the differences between the means of the two curricula were computed. The results also appear in Table 14 which shows that the Kidi-Prep curriculum had a higher mean frequency per observation of teacher behaviors with specific cognitive goals than did the Traditional curriculum. A greater

number of pupil responses were also observed in the Kidi-Prep classrooms. Both of these differences were statistically significant.

Table 14

Differences Between the Means of Observed Teacher Behavior Goals and Pupil Responses

KORLA Categories of Teacher Behavior Goals	Kidi-Prep			Traditional			t
	Mean	N	S.D.	Mean	N	S.D.	
Auditory	49.40	10	6.628	38.99	10	11.500	1.828*
Visual	28.09	10	5.536	18.27	10	9.584	2.002*
General	21.68	10	2.995	14.06	10	4.311	7.898**
Pupil Responses	57.47	10	33.410	36.33	10	20.813	2.890**

**Signigicant beyond .01 level
*Significant beyond .05 level

The teachers kept a weekly log of the number of minutes per week spent in activities focusing upon each of the specified cognitive areas. Some activities involved combinations of several areas at the same time. The data collected from these teachers logs are summarized in Table 15. The means and standard deviations of the number of hours the teachers reported as devoted to activities involving each cognitive process are given in this table.

V. Results for the Metropolitan Readiness Test

Additional information was received from the school district's administration of the Metropolitan Readiness Test during the first week in May. The data from this test support the finding of significant school differences in both curricula. Table 16 provides the means and standard deviations for all of the classes and for both schools.

A 2 x 2 analysis of variance was used to find out if there were significant differences between the two curricula. The results of this analysis are given in Table 17.

Table 15

Mean Number of Hours Per Week Spent in Areas of Activity by Kidi-Prep Classes

	Activity Areas									
	Auditory Reception		Visual Reception		Auditory Visual Association		Visual Association		Verbal Expression	
Teacher	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1	2.50	1.60	2.25	1.50	2.50	1.50	1.01	.51	2.06	.50
2	3.30	.51	2.50	.66	2.90	.51	1.20	.30	2.68	.71
3	2.30	.05	1.08	.00	2.60	.00	.60	.00	1.80	.00
4	.50	.05	.30	.07	.55	.01	.66	.12	.60	.13

	Activity Area											
	Manual Expression		Grammatic Closure		Visual Sequential Memory		Auditory Sequential Memory		Visual Closure		Auditory Closure	
Teacher	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
1	.08	.00	2.90	1.80	1.30	.30	1.05	.53	.66	.30	1.06	.66
2	1.90	.50	3.30	1.13	2.10	.66	2.16	.50	4.20	.19	1.10	.50
3	.72	.00	.51	.09	1.70	.00	1.70	.00	.01	.08	.60	.01
4	.20	.15	.67	.13	.35	.19	.30	.19	.13	.09	.10	.14

Table 16

Means and Standard Deviations for the Metropolitan Readiness Test

	Kidi-Prep			Traditional		
School A	N	Mean	S.D.	N	Mean	S.D.
Teacher 1	23	77.18	14.15	16	71.00	13.20
Teacher 2	15	79.00	9.22	24	78.67	11.46
School Total	38	77.92	12.43	40	75.72	12.72
School B						
Teacher 3	23	57.43	15.36	23	61.44	11.56
Teacher 4	21	55.45	17.14	25	51.33	13.87
School Total	44	56.51	16.24	48	56.28	13.75

Table 17

Treatment by Schools Analysis of Variance
for Metropolitan Readiness Test

Source	Sums of Squares	d.f.	Mean Square	F
Treatment	12105.0000	1	12105.0000	32.2484
Schools	53415.6112	1	53415.6112	142.3025
Interaction	7446.2467	1	7446.2467	19.8372**
Error	62686.2160	167	375.3665	
Total	136811.6471			

**Significant beyond .01 level

The significant treatment by schools interaction shown in Table 17 means that Kidi-Prep was superior to the Traditional Kindergarten curriculum in School A but not in School B. This was not true in all of the School B classes, Appendix F shows that for Teacher 4, Kidi-Prep was superior. Because of this interaction, the significant F ratio for between treatment differences is uninterpretable.

In both curricula large differences between the school means were noted. These differences between the two schools were analyzed using the independent t test of the difference between means. The results of these analyses are given in Table 18.

Table 18

Differences Between School Means on the Metropolitan Readiness Test

	Means		t Value	d.f.	Level of Significance
	School A	School B			
Kidi-Prep	77.92	56.51	6.456	81	.001
Traditional	75.72	56.28	6.6728	87	.001

The difference between the two schools in both curricula was significant beyond the .001 level. The critical value for a significant t value at the .001 level is 3.46; both of the computed t values greatly exceeded this value. These findings reinforce the results of other data reported which show that children in School A appear to be learning more than do the children in School B in either curriculum.

VI. General Discussion

The results of the data analyses showed Kidi-Prep to be superior to the Traditional curriculum in raising the predicted reading levels of kindergarten children as indicated by scores on the Jansky index. That there were differences between schools was apparent from both the descriptive data reported and the data analyses. Some differences among teachers were also found. To determine probable sources of the differences found, the two curricula were examined for basic differences and similarities.

A cursory examination of the outlines of the two curricula showed that they differed during only one hour of each daily kindergarten session. It was the structure and the objectives of instructional activities during this hour that appeared to be causing the differences in the effects of the two curricula.

In the Kindergarten Diagnostic Prereading Program classrooms, this hour was used for three planned 15-minute periods of small group structured independent activities and one 15-minute period of teacher-directed learning activities for each of the groups during the hour. This schedule allowed all of the children to experience all of the planned structured activities each day. The activities were devised to provide children with experiences involving one or more of the cognitive processes specified. The Cemrel materials provided for use during teacher-directed periods were arranged to provide sequential instruction in the cognitive skills necessary for entry level requirements of the beginning reading process. The fact that the classes were divided into small groups of from 5 to 7 children for this one hour of instruction was one of the primary differences between the Kindergarten Diagnostic Prereading Program and Traditional Kindergarten curricula. This allowed the teachers to work closely with individual children during the teacher-directed activities.

The second primary difference was that in the Kidi-Prep classes the teacher planned learning activities with specific cognitive objectives for the independent learning stations daily as well as for the teacher-directed activity. In the Traditional Kindergarten classes, this hour was specified as "free play" or "free choice activities." Although the Traditional Kindergarten classes had various centers in the rooms, there were little small group organization and few specifically planned activities through which each child progressed as part of a group. The diagnostic phase of the experimental curriculum was useful as a basis for grouping for instruction. In both of the curricula, the remainder of each kindergarten session was spent in identical activities.

CHAPTER IV

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

I. Summary

An experimental design with both experimental and control groups was used to evaluate the effect of a diagnostic, structured kindergarten curriculum upon the predicted reading levels of low income area children. The effect of this diagnostic structured kindergarten program upon the predicted reading levels of the children was also compared with the effect of the Traditional Kindergarten curriculum. The effects of the two curricula upon the total group of children in each curriculum and upon the subgroups of Predicted Reading Level-Failure children within the total groups were compared.

Sample

The sample used in the study was 196 children, the total kindergarten population of two low income area schools within the Altoona Area School District in Pennsylvania. Approximately three-fourths of the children in the sample came from low socioeconomic homes. Children were assigned to classrooms within schools by a procedure of systematic randomization and classes were randomly assigned to treatments. This sample was considered to be representative of most small city low income area schools.

Testing

The Kindergarten Diagnostic Prereading Program and the Traditional Kindergarten classes were pretested using the Jansky Predictive Index of Reading Performance during the last two weeks of September. The pretest scores identified the children in both groups whose scores predicted future reading failure (PRL-F). The Illinois Test of Psycholinguistic Abilities (ITPA) was administered to the PRL-F children in the Kidi-Prep classes during the first two weeks in October. The ITPA results provided a diagnostic profile for each child. The Jansky index was used as a posttest for both groups. The posttesting was done during the last week of April and the first three weeks in May.

Treatments

A five-day workshop was held in August before the beginning of the 1971-72 school term for the teachers involved in the study. An overview of the Kindergarten Diagnostic Prereading Program (Kidi-Prep) and training in the use of the program and the Cemrel materials were provided during this workshop.

When the study began the third week in October, the teachers were given ITPA profiles for use in grouping for instruction in the Kidi-Prep classrooms. This curriculum differed from the Traditional Kindergarten curriculum in that one hour of each kindergarten session was spent in structured activities planned to develop specific cognitive competencies and conceptual skills. The activities were done at both teacher-directed and independent learning centers in small groups and the Cemrel Language and Thinking kits with teacher guides were provided for the teachers' use.

The Traditional Kindergarten classes had free play and free choice activities scheduled during this hour each day. Although there were sometimes several activity centers, there were no arrangements for each child to spend some time at every station.

Except for this one hour of each kindergarten session, the Kidi-Prep and the Traditional Kindergarten programs were alike. Each teacher taught two sessions a day; one session used the Kidi-Prep and the other session used the Traditional Kindergarten curriculum.

Both the Kidi-Prep and the Traditional Kindergarten classes were observed on a biweekly basis during the school term. The apparent goals of the teacher behaviors and the pupil responses elicited were recorded using the KOPLA observation schedule.

Findings

The Kindergarten Diagnostic Prereading curriculum raised Jansky index scores, which predict future reading levels, a significantly greater amount than did the Traditional Kindergarten curriculum. This result was found for both total groups and for subgroups of Predicted Reading Level-Failure children in the two curricula.

A significant difference between School A and School B in both curricula was found when the total groups were considered. There was also a difference among teachers within the curricula.

II. Conclusions

From the data analyses reported it appears that the Kindergarten Diagnostic Prereading curriculum was significantly more successful in raising the predicted reading levels of kindergarten children than was the Traditional Kindergarten curriculum. This finding held true both for the Predicted Reading Level-Failure children within each curriculum and for the total groups of children.

Effects of the Kindergarten Diagnostic Prereading Program upon Predicted Reading Level-Failure Children

In the analysis, the effects of Kidi-Prep upon PRL-F children showed that the proportion of PRL-F children in the Kindergarten Diagnostic Prereading group at the end of the study was considerably smaller than the proportion of PRL-F children in the group at the beginning of the study. This difference in proportions was larger than a difference that could occur by chance. The pre to post treatment difference in the proportion of RPL-F children in the Traditional Kindergarten curriculum was also greater than a chance difference. While part of such change must be attributed to maturation, some portion may result from the kindergarten curricula. It is reasonable to assume that both groups had similar amounts of maturation contributing to their posttest scores. When the z scores associated with the pre and post treatment differences in proportion were examined, the higher z score shown for the Kidi-Prep group indicated that, if the maturation effect were equal in the two groups, the effects of the Kindergarten Diagnostic Prereading Program in raising predicted reading levels of children were greater than the effects of the Traditional Kindergarten curriculum.

Comparison of the Effects of the Kindergarten Diagnostic Prereading Program with the Effects of the Traditional Kindergarten Curriculum

Effects upon Predicted Reading Level-Failure Children

When the effectiveness of the Kindergarten Diagnostic Prereading curriculum in raising predicted reading levels of PRL-F children was compared with the effectiveness of the Traditional Kindergarten curriculum using analysis of covariance, the findings supported the results of the tests of proportions. There was a statistically significant difference between the two curricula in the effects upon Predicted Reading Level-Failure groups of children. A greater number of PRL-F children in the Kindergarten Diagnostic Prereading Program than in the Traditional Kindergarten curriculum had posttest Jansky index scores above the level of predicted reading failure.

Effects Upon the Total Group

Although the study was primarily concerned with the Predicted Reading Level-Failure children, additional analyses were done to determine the comparative effectiveness of the Kidi-Prep and T-K curricula upon the predicted reading levels of the total groups of children in the study. The analyses of data reported on the total groups again show Kidi-Prep to be significantly higher on Jansky index posttest scores, which are predictive of reading success or failure.

School Differences. The analyses of covariance done on the data for total groups also showed significant differences between the two schools within treatments and between the teachers within treatments. When school means were examined, School A was consistently higher than School B in both curricula. This difference between schools was statistically significant only in the Kindergarten Diagnostic Prereading curriculum. When the means for the individual classes within each curriculum were examined in both of the treatments Teacher 1 and Teacher 2 in School A had higher Jansky posttest class means than did the two teachers in School B. However, the only statistically significant difference was in the Kindergarten Diagnostic Prereading Program between Teacher 2 in School A and Teacher 3 in School B.

The difference between the schools on the Jansky index adjusted posttest scores reached the .05 level of significance, and this difference was supported by the results of the analysis of data from the school district administration of the Metropolitan Readiness Test in May. When class means and standard deviations were examined, there were minimal differences between Kidi-Prep and T-K classes for each teacher. However, the Kindergarten Diagnostic Prereading Program means are higher for all classes except those of Teacher 3 in School B.

The major differences found in the analyses of the Metropolitan Readiness Test data were those between the two schools in both the curricula. The difference between the means of School A and School B in both of the curricula was statistically significant beyond the .001 level. The kindergarten children in School A showed a higher level of learning than did the children in School B kindergarten classes.

The data reported on the Kidi-Prep teacher logs showed the number of minutes used each week for activities designed to develop the specified cognitive processes. These data again reflect the strong differences between the two schools. School A teachers reported more time spent in every area than did School B teachers. The School B teachers did not vary the amounts of time reported in the various areas each week but consistently reported identical time patterns. It is possible that the teachers in School B did not consciously consider the independent station activities when accounting for instructional time. Whatever the reason, school differences are apparent in the teacher logs.

Information provided by the school district showed that for the 1970-71 school term School A had two kindergarten retentions and School B had 12 such retentions. For the the 1971-72 school term, both schools retained two kindergarten children. The 1971-72 retentions were for reasons of social immaturity. It is possible that this difference in the number of retentions may have been the result of the experimental program.

The differences between schools could be attributed to observed differences in the attitudes of the teachers in the two schools toward structured cognitive oriented activities in kindergarten. Both of the teachers in School A demonstrated a favorable attitude toward Kidi-Prep; in School B the two teachers were rather noncommital and uninvolved. The School B teachers stopped Kidi-Prep immediately at posttest time; in School A the teachers continued to use it for the last few weeks of the school term. Although having teachers in both treatments controlled for overall teacher effects within the treatments, the teacher variable seemed to be one of the causal factors in the school differences.

Teacher Differences. Information on the differences between the teachers was obtained from the records of the classroom observations and teacher logs for the Kidi-Prep curriculum. The classroom observation data showed that for all of the teachers but Teacher 3 the Kidi-Prep classes had higher means and standard deviations than the Traditional Kindergarten for all three major cognitive areas and for most of the subcategories. (See Appendix F) The higher standard deviations shown for Kidi-Prep classroom observations indicated that the teachers used more flexible strategies and a greater variety of activities in the Kidi-Prep classes than in the Traditional Kindergarten classes. The record of overt pupil responses recorded during the observations showed a much higher mean number of total pupil responses in Kidi-Prep classes during the observations than in the Traditional Kindergarten classes. Again Teacher 3 in School B was an exception to the overall findings. However, it should be noted that the higher number of motor responses in Teacher 3's T-K class contributed to the high mean for pupil responses in this class. This was the only class in which this abundance of physical response was observed.

Although definite differences between teachers were observed and recorded, only in the classes of Teacher 3 did teacher effect appear to interact with the treatment and equate the effects of the two treatments. In all of the other classes, the Kindergarten Diagnostic Prereading Program was superior to the Traditional Kindergarten curriculum. Teacher 3's experimental classroom had the lowest adjusted Jansky posttest mean and her Traditional Kindergarten class had next to the lowest adjusted Jansky posttest mean.

The disparity between the results shown for Teacher 3's classes and the other teachers' classes cannot be attributed to initial differences between the groups since the analysis of covariance adjusted the posttest scores for the initial differences.

Implications for Education

The results of this study show that kindergarten experiences do affect the cognitive skills and conceptual competencies related to future reading achievement. The diagnostic structured kindergarten

curriculum proved to be more effective than the Traditional Kindergarten curriculum in improving these competencies and skills.

The results suggest that a kindergarten curriculum should include a definite period of time each day for planned, diagnostic, structured learning experiences. This daily instructional period should involve both small group, independent activity and teacher-directed activities planned so that each child participates in each activity. Activities planned for small group instruction should be extensions of the teacher-directed activities and should focus on specific areas of cognitive skills and conceptual compentencies.

From the findings of this study it would appear that, in general, differences in teacher effects can be reduced if adequate information is provided for the teacher about the kinds of teaching strategies and teacher behaviors expected. In addition to this general information, sample lessons with objectives related to specific cognitive skills and conceptual competencies ought to be provided for the teachers. Instruction in all areas should begin with simple activities and move into the more complex.

First grade reading readiness materials and activities should not be used. The kindergarten curriculum should provide activities and experiences which build the skills and competencies a child needs to function adequately when he begins the first grade readiness program. A child who had had no experiences that require him to apply cognitive skills such as discrimination, identification, association, and who has had no opportunity to develop conceptual competency in forming classes based on criterial features, in establishing cause and effect relationships, in being aware of one to one and one to many correspondence and in recognizing and applying rules of structure and usage, will have more difficulty in mastering reading readiness materials than the child who had had these experiences.

III. Recommendations

The major purposes of this study were to determine the effects of a diagnostic structured kindergarten program upon predicted reading levels and to compare the effects of this program with the effects of a Traditional Kindergarten program. The results of the study showed that the diagnostic structured program was superior to the Traditional Kindergarten program. In view of this finding the following recommendations are made:

(1) A longitudinal follow-up study of the Predicted Reading Level-Failure groups of children should be planned to assess the stability of the treatment effects. A standardized reading test should be administered at the end of each school term from 1st through 6th grades to find out how many PRL-F children are achieving adequate level of reading competency.

(2) This study was limited in the range of socioeconomic levels and in racial representation. It should be replicated on a larger scale with an adequate range of socioeconomic levels and races other than Caucasian in the sample. A levels by treatment design should be used for such a study to determine differences in the effects of the treatment on the various socio-economic levels and the racial groups. When a replication is planned, one instrument in addition to the Jansky index should be used in the pre- and posttesting. This additional instrument should be one of the standardized readiness tests.

(3) Other studies of this type should include testing at the end of the first half of the total time period involved. This would provide the investigator with information as to when the differences between treatments begin to appear. It is possible the same results could occur over a shorter period of time.

(4) The findings of this study should be provided to school districts for consideration in planning kinder-garten curricula.

(5) The Pennsylvania Department of Education Guidelines for Kindergarten Curriculum recommends that concepts be developed through "incidental learning." In view of the findings of this study that the effects of a structured curriculum are superior to the traditional, incidental learning kindergarten curriculum it is recommended that these guidelines be modified to include a daily period of structured learning experiences focusing on specific cognitive skills and conceptual competencies.

(6) The administration of the ITPA provided an excellent diagnostic profile of areas of language deficiencies but it is expensive to administer in terms of both money and time. A check list based upon the language areas should be developed for teachers to use in informal classroom diagnosis.

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Appendix A-1

Jansky Modified Screening Index

Letter Naming

Six letters of the alphabet were exposed and the children were asked to name them. Score is the number of errors.

Picture Naming

The children's performance on 10 items of Peabody Picture Vocabulary Test is used to judge comprehension of single nouns, verbs and adverbs.

Sentence Naming

Sentence memory section from the Stanford Benet, Level 4 is used.

Gates Word-Matching Subtests

Each child is asked to do twelve of the eighteen exercises from the Word-Matching subtest of the Gates Reading Readiness battery. The twelve exercises used are (reading in rows from left to right): 2, 3, 4, 5, 8, 9, 10, 11, 14, 15, 16 and 17. The first exercise is used for demonstration.

Instructions

The examiner shields all but the first exercise, saying, "There are two words in this box which look exactly alike. Can you find them? Take your pencil and draw a line between the ones that look the same. Now you do the next one by yourself." If the child fails to understand what is required, the examiner clarifies the task. The shield is removed after the child completes exercises 2 and 3.

Scores

The number of mistakes, from 0-12, is the child's score.

Bender Visuo-Motor Gestalt Test

The child is asked to copy six (A, 1, 2, 4, 6 and 8) of the nine designs.

Ability to perceive and respond to the essentials of the Gestalten and degree of differentiation are evaluated. Criteria were discussed with Dr. Lauretta Bender.

Instructions

"Here are some designs for you to copy. Just copy them the way you see them."

Score

The score is the number of copies, from 0-6, on which the child fails to reproduce the essential features of the Gestalt. One point is added if he is unable to arrange the designs on paper--if, for instance, designs are superimposed on one another. Another point is added if he rotates three or more of the figures.

Appendix A-2

Sample Items from ITPA

Visual-Motor Sequencing Test

Purpose: The purpose of this test is to assess Ss ability to reproduce a sequence of visual stimuli from memory. Each item requires a certain number and type of picture or form chips and a tray in which to arrange them in a given sequence. E places a given set of chips in a certain sequence in the tray, allows S to observe this sequence for five seconds, dumps the chips out, and requires S to duplicate the sequence.

There are two kinds of chips used: pictures, and outline geometric forms. Chips are allowed to accumulate; that is, chips used in previous items are left on the table even though new chips may be added. The only time E takes the chips away is upon the completion of picture chip items. E should keep a continuity in the test at this point by avoiding superfluous explanations and by using the same instructions throughout.

The number, type, and sequence of chips to be used for each item is indicated on the record form. The following conventions are used:

a. 3 means a triangle
b. s means a square
c. o means a circle
d. 6 means a hexagon
e. d means a diamond
f. 5 means a pentagon
g. z means a trapezoid
h. 8 means an octagon

Below is an illustration of the tray and chip placement for item 3. Note the relationship of the words on the record form with the order in which the pictures are placed in the tray. Note also that the chips used on previous items are lying randomly about (they have not been taken away). After this item (3), all picture chips are removed before commencing with item 4; form chips are similarly allowed to accumulate from item 4 to the ceiling or end of the test. Thus, not only do sequences become more difficult to remember as the test continues, but S has an increasingly larger number of chips from which to select those he will use in a given sequence.

Auditory-Vocal Association Test

1. I sit on a chair; I sleep on a _____.
2. I eat from a plate; I drink from a _____.
3. A bird flies in the air; A fish swims in the _____.
4. I hit with my hands; I kick with my _____.
5. John is a boy; Mary is a _____.
6. A scissors cuts; A pencil _____.
7. I cut with a saw; I pound with a _____.
8. Soup is hot; Ice cream is _____.
9. A red light says stop; A green light says _____.
10. During the day we're awake; at night we _____.
11. I eat with a spoon; I cut with a _____.
12. On my hands I have fingers; On my feet I have _____.
13. A boy (girl) runs; An old man (woman) _____.
14. Cotton is soft; Stones are _____.

Appendix A-3

KORLA-T - Kindergarten Observation Record
for Language Arts - Teacher

Background

KORLA-T (Kindergarten Observation Record for Language Arts - Teacher) was developed for use in an investigation of the effects of kindergarten instruction upon reading levels. It is a systematic method of collecting data about the goals of overt teacher behaviors and the levels of response; these teacher behaviors elicit from children. KORLA is designed only for observation during language arts instructional time and the categories for the goals of teacher behavior relate to specific areas of the language process.

The environment side of the observation schedule provides a description of the grouping arrangements, materials, audio-visual equipment used, etc. The process side provides a description of the area of the language process on which the teacher's behavior is focused and the level of pupil behavior elicited, verbal, motoric or nonresponsive. There are 14 goal categories designed to provide simple nonevaluative discriminations of the goals of teacher behaviors.

General Procedures

Time Unit. The basic unit for a teacher is 10 minutes for each Observation Episode (OE); five categorical statements are marked during each OE in the order of occurrence at two-minute intervals. Visits are scheduled only during language arts periods and the maximum observation time for any visit is 60 minutes. Although the total 60 minutes can be used to observe only the teacher, it is possible, using KORLA-T, to include recordings of responsive behaviors of the children.

Classroom Observation Technique. The observer enters the classroom as unobtrusively as possible and chooses the location from which he will do

his observing. Total teacher observation should be completed from this location if possible. However, if the teacher is circulating, it may be necessary for the observer to shift his position. This shifting must be unobtrusive.

Goal Categories

1. LISN--Listening--The teacher provides a verbal stimulus which requires no overt response other than attending.

Teacher behaviors such as:

a. reading or telling a story
b. orally presenting rules for behavior for the first time
c. verbal presentation of a list of facts, e.g. Today is Monday, It is the first day of September, etc.

2. AUD-R--Auditory Reception--The teacher provides a verbal stimulus which requires a response from the child which indicates he has understood and interpreted the stimulus.

Teacher behaviors such as providing:

a. a series of directions, gradually increasing complexity as memory will allow
b. practice in identifying an object or an action that the teacher describes
c. practice in distinguishing sounds of letters and words
d. practice in answering simple questions--child learns to respond quickly to exercise (requires concentration) e.g., "Do you eat?," "Does a ball run?," "Can you run?"

3. AUD-A--Auditory Association--The teacher provides verbal stimulus which requires the child to demonstrate ability to draw relationships.

Teacher behaviors such as providing:

a. practice in answering thought questions, e.g., "What can you do with a ball?," "How many wheels does a car have?"
b. practice in problem solving, e.g., "If you couldn't find a toy in your toy box, how would you go about finding it?," "If your friend fell, what would you do?"
c. practice in answering or telling how two or more things are alike. "How are an apple and an orange alike?"
d. practice in knowing the difference between all, some, few, on, over, under, in, between, above, e.g., "Put the doll in the box," "Stand between Mary and John," "Which is bigger, the book or the pencil?"

e. practice in answering cause and effect questions, e.g., "What would happen if a dog and cat were put into a room together?"
f. practice in oral number problems, e.g., Take away all except two

4. AUD-SM--Auditory Sequential Memory--The teacher presents verbal stimuli in a sequential order and requires the child to reproduce the stimuli in sequence.

Teacher behaviors such as:

a. playing "I am packing my trunk" type of games
b. teaching of ordinal numbers
c. teaching rote memorization of the alphabet
d. providing practice in puppet dialogue
e. providing practice in repeating short sentences
f. providing practice in singing songs
g. providing practice in answering questions relating to which comes first, second

5. AUD-CL--Auditory Closure--The teacher provides incomplete verbal stimuli which requires a child to provide proper conclusions.

Teacher behaviors such as:

a. unfinished story is provided
b. incomplete rhyme is provided
c. a sentence is given with words missing

6. VIS-R--Visual Reception--The teacher provides visual stimuli which requires a response from the child indicating he has understood the stimuli.

Teacher behaviors such as providing:

a. practice in observing details in pictures, completing what's missing
b. practice in sorting tasks (objects, pictures, symbols)
c. practice in identifying colors, letters, words, numbers, geometric forms, etc.
d. practice in matching and measuring, and ordering (graduations)
e. practice in distinguishing similarities and differences in sizes, shapes, lengths, forms, colors, texture
f. practice in recognizing numbers, words, and symbols when rearranged
g. the idea of inclusion, the part being contained in the whole, e.g., two black and 10 white buttons, and asked, "Are there more black buttons than white buttons?"
h. practice in labeling objects

7. VIS-A--Visual Association--The teacher presents visual stimuli which requires a child to demonstrate ability to draw relationships between these stimuli.

Teacher behaviors such as providing:

a. practice in classifying pictures, objects, in specific categories, relative to functional, nominal attributes (functional, how they can be used; nominal, whether they are animals, people, toys, furniture, etc.)
b. practice in finding pictures of opposites, sad, happy, round, square
c. practice in finding which does not belong out of a group of pictures or objects
d. practice in identifying community helpers, members of a family

8. VIS-SM--Visual Sequential Memory--The teacher provides a sequential pattern of visual stimuli and the child is required to reproduce it correctly.

Teacher behaviors such as providing:

a. practice using puzzle sequences, e.g., putting a human form together, a ball, a wagon (two-part puzzle), etc.
b. practice in putting a series of pictures in sequence relating to a short story or nursery rhyme
c. practice in assemblying objects, toys, etc.
d. practice in finding directions in simple maze patterns
e. practice in sequentially ordering numbers and letters of the alphabet in game form
f. practice in finding games--locating what is missing in an array
g. practice recalling correct sequence of items, before placed under cup, etc.
h. practice in using forms a child can put in order of size--big, smaller, smallest

9. VIS-CL--Visual Closure--The teacher provides incomplete visual stimuli which requires a child to provide missing parts.

Teacher behaviors such as:

a. providing incomplete picture or design to be finished
b. providing opportunity to identify whole figures from parts

10. VERB-X--Verbal Expression--The teacher provides opportunities for meaningful verbal expression by the child.

Teacher behaviors such as providing:

a. practice in describing objects, toys, what's happening in a picture
b. practice in talking about what has been experienced

c. practice in telling what community helpers do, and family members do
d. practice in social communication
e. practice in retelling short stories

11. MAN-X--Manual Expression--The teacher provides materials and opportunities for manual expression on the part of the child.

Teacher behaviors such as providing:

a. practice in imitating body movements of teacher, animals, etc.
b. practice in manipulating and exploring use of objects, toys, and play equipment
c. practice in making clay figures
d. practice in showing how to use objects
e. practice in showing the way things move, e.g., clock, swing, etc.
f. practice in role playing

12. CON--Conversation--The teacher provides time to engage in verbal exchange with another person (not necessarily meaningful).

Teacher behaviors such as:

a. allows children to converse with each other
b. finds time to talk with individual children

13. GRAM-CL--Grammatic Closure--The teacher provides a model of correct grammar and reinforces use of correct grammatical patterns by the children.

Teacher behaviors such as providing:

a. practice in using adjectives or descriptive words
b. practice in using action words, e.g., hop, skip, run, walk, etc.
c. practice in completing sentences, e.g., using pictures and state, "Here is a girl, here are two girls." "Mary is walking. John is running."
d. practice in using words or opposite meanings, with pictures, e.g., hot (fire), cold (ice cream), red (light), green (light)
e. practice in social use of language, e.g., "Good morning," "Thank you," "Please"
f. practice in functional use of language. Have children ask the other children to give, or do something
g. practice in self-use of language, e.g., expressing how one feels, or what one needs, etc.
h. practice in expressing degrees in comparison. Using pictures or objects, state: "This box is big, this box is bigger."
i. defining words, e.g., "What is an orange, car, ball, etc.?"

14. UN--Unclear--The teacher's behavior has no apparent goal in any of the language processes.

Unclear goal area would be characterized by general confusion and unproductive activity in the classroom.

Categories of the Level of Response Elicited by Teachers' Behaviors

M--Motor Level--Teacher behavior elicits a motoric response from the child.

V--Verbal Level--Teacher behavior elicits verbal response from the child.

√M--Verbal Motor--Teacher behavior elicits an integration of verbal and motoric response from the child.

X--No Overt Response--Teacher behavior elicits no response other than attention from the child.

General Instructions for Completing a Teacher Observation Record

The observer completes the environment side of the schedule as soon as he has taken his position in the classroom. When this is completed, he begins the process side of the schedule using a stopwatch or other timing device such as an egg timer to regulate his recording. An observation statement is recorded every two minutes until five such statements are recorded. The symbols for the levels of children to the teachers' behaviors are recorded in each goal area of the schedule. It would be possible during a one two-minute segment to have responses marked in more than one goal area if the teacher's behavior had several coordinated goals.

Appendix A-3 (cont'd)
KORLA-T

Kindergarten Observation Record for Language Arts

Grouping	1	2	3	4
Small Group	☐	☐	☐	☐
Total Group	☐	☐	☐	☐
Tchr. Dir.	☐	☐	☐	☐
Ind. Wrk	☐	☐	☐	☐

Materials				
Tch. made	☐	☐	☐	☐
Pupil made	☐	☐	☐	☐
Comm.	☐	☐	☐	☐
Manipulative	☐	☐	☐	☐
Req. V Resp.	☐	☐	☐	☐
Req. Phys. Resp.	☐	☐	☐	☐

AV Equipment				
CVRHD	☐	☐	☐	☐
MVPro	☐	☐	☐	☐
Tape R.	☐	☐	☐	☐
RCRD.	☐	☐	☐	☐
Pict.	☐	☐	☐	☐

Date _____ Teacher _____

Time _____ Pupil _____

T.O. (Transient Obs.) _____ S.O. (Static Obs.) _____

Remarks	General Check List
1.	1. Materials were provided for each station or table. Yes 1___ No 1___ 2___ 2___ 3___ 3___
2.	2. All the children participated in every activity. Yes 1___ No 1___ 2___ 2___ 3___ 3___
3.	3. Children were provided with adequate materials and directions for use. Yes 1___ No 1___ 2___ 2___ 3___ 3___
	4. Instruction was structured and directed. Yes 1___ No 1___ 2___ 2___ 3___ 3___

(Environment)

Appendix A-3 (cont'd)

Goal Categories	Auditory						Visual					General				
OE-1	LIS	R	A-V-A	SM	CL		R	A	SM	CL		V-V	MM	CCM	G-CL	
1st-2 min.																
2nd-2 min.																
3rd-2 min.																
4th-2 min.																
5th-2 min.																
OE-2																
1st-2 min.																
2nd-2 min.																
3rd-2 min.																
4th-2 min.																
5th-2 min.																
OE-3																
1st-2 min.																
2nd-2 min.																
3rd-2 min.																
4th-2 min.																
5th-2 min.																
Total																

*Marking Code

X - elicits no overt response M - elicits a manual response

V - elicits a verbal response √M - elicits integration of verbal and manual response

(Process)

Appendix B-1

Instructional Objectives and Description of the Materials for the Cemrel Language and Thinking Program Packages

Instructional Objectives

Colors-Shapes-Sizes

The teaching objectives of the Colors-Shapes-Sizes Package are met when the child can

Colors Section

1. select and identify objects and pictures of objects that are the same and different colors.

2. sort objects according to their colors.

3. use the names of colors--red, yellow, green, orange, purple, brown, black and white to describe objects and pictures of objects.

4. respond by selecting the appropriate objects or pictures when the teacher uses declarative, affirmative-negative, singular-plural sentence forms to describe objects.

5. respond by selecting the appropriate object or pictures when the teacher uses declarative, affirmative-negative, singular-plural sentence forms to describe objects that the same and different colors.

6. select colors (objects-pictures) when given specific directions, e.g., "Find the ball that is blue."

7. respond with appropriate answers to questions asked about the color of objects or pictures.

8. use the interrogative sentence form to ask about the color of an object or a picture.

9. recognize and identify the colors of objects as they exist in the environment, e.g., real life objects.

10. recognize some objects <u>can be</u> a variety of colors and that some objects are always the same color.

11. color objects to instructions.

12. copy a colored object.

Suggested age levels:

Age	Objectives
3	1-6
4	1-6, 7, 9
5/6 or above	1-12

Shapes Section

13. select and identify shapes and pictures that are alike and different.

14. sort objects according to shape.

15. match shapes on paper.

16. use the names of shapes - circle, rectangle, triangle, square, crescent, diamond, oval, parallelogram.

17. respond by selecting the appropriate item (shape) when the teacher uses the declarative sentence form to describe cut-out shapes, blocks, or pictures of shapes.

18. draw and color the shapes.

19. respond by selecting the appropriate item when the teacher uses declarative sentence forms to describe shapes that are alike and different.

20. respond by selecting the appropriate item when the teacher used the adjective form in declarative sentences describing shapes, e.g., "This figure is circular." The child is expected to select an object or cut-out shape which fits the description.

21. select and identify the shapes when given specific directions to follow, e.g., "Find a triangle. Tell us what shape you found."

22. combine the use of color and shape in describing an object or a picture, or in response to combination descriptions, e.g., "This triangle is yellow. These rectangles are red and blue."

23. recognize the shapes listed in item one above as they exist in the environment, e.g., things that have recognizable shapes like the plane figures.

Suggested age levels:

Age	Objectives
3	13-19
4	13-19, 21, 22, 23
5/6 or above	13-23

Sizes Section

24. sort objects according to size.

25. select and identify objects that are the same and different sizes.

26. match objects that are alike or different when pictures or worksheets are used.

27. respond by selecting appropriate items when the teacher uses declarative sentence forms in describing the size of objects.

28. select objects or pictures when given specific instructions including the size of the object or the pictured object.

29. use appropriate terms to identify the selected objects, fat-thin, tall-short, long-short.

30. describe the comparisons of objects and pictured objects that are the same and different sizes.

31. identify, compare, and describe the relative sizes of objects (big, biggest, small, smallest, etc.)

32. use the interrogative sentence form to ask about the sizes of objects or the sizes of illustrated objects.

33. respond by selecting appropriate items when the teacher uses the terms height and length to refer to the height and length (how tall - how long) of objects presented.

34. combine shape and size in describing objects with prompts from the teacher.

35. recognize the relative size of objects as they exist in the environment, e.g., The child understands that size is relative and an appropriate description fits the specific comparison or situation.

Suggested age levels:

Age	Objectives
3	24-29
4	24-31
5/6 or above	24-35

Colors-Shapes-Sizes: Combinations and Comparisons

36. recognize incorrectly colored objects and provide information concerning the usual colors of the objects.

37. recognize incorrectly shaped objects and provide information concerning the usual shapes of the objects.

38. recognize incongruous size situations and provide information concerning the appropriate size.

39. respond by selecting the appropriate objects when the teacher uses the conjunction "and" to describe objects that are two or more colors.

40. respond by selecting the appropriate object when the teacher uses the disjunction "or" to describe objects that are one or the other color.

41. identify how the secondary colors (green, orange, blue, brown) are created by mixing combinations of the primary colors.

42. describe differences between shapes according to their formal characteristics, e.g., "A rectangle and a triangle are different. A rectangle has four sides and angles and a triangle has three sides and angles."

43. infer the correct name of a shape which is not visible by asking questions about its formal characteristics.

44. infer the correct size of an object which is not visible by asking questions.

Suggested age levels:

Age	Objectives
3	39
4	36-40
5/6 or above	39-44

INSTRUCTIONAL OBJECTIVES

Directions

The teaching objectives of the Directions Package have been met when the child can correctly

1. identify illustrations of characters (arrows, letters, flags, etc.) which are facing left or right, as facing the same and different directions, with prompts from the teacher.

2. identify and match illustrations of characters which are facing left or right as facing the same and different directions, using worksheets or other printed materials.

3. can identify his left and right sides (hands, feet, arms) while facing in any direction with prompts from the teacher.

4. can identify the left and right sides of illustrated characters which are pointing left or right, or which are facing either direction.

5. can identify illustrations of people who have left or right hands arms raised when the illustrations show the backs and faces of the people.

6. identify the right and left sides of appropriate written materials e.g., books, paper, on blackboards, pictures.

7. place objects in response to directions which include the use of the prepositions and adverbs on, in, behind, around, over, under, above, below, next to (beside), in front of, and in back of, between, before, after.

8. identify objects in the same and different locations.

9. describe the position of objects which are placed or illustrated as a demonstration of the prepositions and adverbs listed in item 7.

10. identify the correct position of objects from verbal description.

11. follow directions which involve his action; e.g., "Go around the table and stand beside it."

12. use the interrogative sentence form to find out the location of an object or person with prompts from the teacher.

13. sort objects according to their locations in the environment; e.g., furniture, animals, kinds of buildings.

14. give directions using appropriate prepositions and adverbs that have been presented.

15. respond to the teacher's use of descriptions which include color, shape, size, and position of an object. "The plate is big and circular and red. It (the plate) is beside the spoon. The spoon is on the right side of the plate."

16. infer the correct location, position, or direction of an object or person that is not visible by asking appropriate questions.

17. describe the positions of a number illustrated objects using multiple descriptions; e.g., "The boy jumped over the box, crawled under the table, between the barrels, in front of the tree, to get to the store."

18. follow directions to produce an illustration, e.g., "Draw a circle on the left side of the paper, at the top. Draw two triangles at the bottom on the right."

Suggested are levels:

Age	Objectives
3	1 (Most activities are appropriate, mastery at all levels are not expected.)
4	1-11, 13 (The above statement may also apply to four year olds.)
5-7	1-18

Appendix B-1 (cont'd)

INSTRUCTIONAL OBJECTIVES

Blends

The teaching objectives of the Blends Package are met when the child can correctly

1. discriminate likenesses and differences in colors, shapes, sizes and locations.

2. match objects that are like in color, size, shape, or location.

3. sort objects according to color, size, shape and location.

4. respond to the teacher's use of statements to identify likenesses and differences of colors, shapes, sizes, and locations.

5. respond to the teacher's use of declarative affirmative-negative, singular-plural statements to identify the colors, shapes, sizes, and locations of objects, pictures, people, etc.

6. mix primary colors to produce secondary colors.

7. draw objects according to instructions which combine any two of the ordering concepts.

8. draw and color simple objects and shapes.

9. draw and color different size objects.

10. draw objects in different locations; e.g., on, in, etc.

11. discriminate between the appropriate and inappropriate use of "is" and "are" when used to describe singular and plural subjects.

12. use the interrogative sentence form to ask about the color, shape, size, and location of objects, pictures, people, etc.

13. describe colors, shapes, sizes, and locations of objects in the environment; e.g., the colors of growing things under various conditions (seasons), the shapes of traffic signs, buildings, parts of buildings, furniture, etc., the size of apartment houses (high rise) compared to one story buildings, the locations of things you buy, furniture in the house, airplanes that fly, etc. (The descriptions need not be in complete statement form.)

14. measure the length and width of objects.

15. identify relative size of objects by measuring them.

16. identify relative sizes of objects by measuring them.

17. infer the correct name, color, shape, size, or location of objects by asking questions about these features.

18. solve simple problems which involve the use of rules learned in relationship to color, shape, size, and usual location, objects, people, that have been presented previously.

Suggested age levels:

Age	Objectives
3	1-5
4	1-10
5, 6, 7	1-18

INSTRUCTIONAL OBJECTIVES

Action

The teaching objectives of the Action Package are met when the child can correctly

1. identify the following action words (verbs) from pictures and demonstrations:

run	push	fly	call
jump	carry	climb	dig
sit	turn	pass	drive
stand	laugh	point	ride
dance	smile	show	fight
catch	wave	tell	find
drink	drop	ask	build
eat	hit	copy	fix
give	hold	mark	hide
kick	lift	choose	put
march	rub	teach	tie
open	shake	draw	cross
close	touch	pick	buy
shut	sleep	carry	speak
sing	talk	take	begin
throw	hop	give	pass
walk	hunt	start	race
bring	grow	finish	reach
go	live	try	send
come	count	like	die
lead	read	answer	kiss

follow	write	trade	wrap
pull	swim	shake	sting
bend	tear	cover	play
cut	wash	break	dress
row	sail	move	cook
hang	cry	make	sweep
move	fish	turn	stop
slip			

2. recognize actions being performed as alike or different.

3. select the correct pictured action from a group of pictured actions.

4. respond to the teacher's use of appropriate statements using the present tense of the verbs listed in the first, second, and third person pronouns; e.g., I am jumping. He is jumping. We are jumping.

5. respond to the teacher's use of the pronoun "it" to describe actions performed by animals and objects for which gender is not known; e.g., the cat (it) is sleeping. The book is laying on the desk.

6. respond to the teacher's use of appropriate descriptive statements to describe an action being performed.

7. respond to the teacher's use of transitive verbs with common objects to describe an action; e.g., kicking a ball; lifting a book, etc.

8. ask and answer questions about actions which are pictured and demonstrated.

9. recognize and describe several actions which are pictured and demonstrated simultaneously; e.g., He is sitting and eating.

10. identify the past tense of action words (verbs).

11. respond to the teacher's use of appropriate statements using the past tense of verbs with the first, second, and third person pronouns.

12. identify the use of <u>were</u> with the plural subject and with the singular and plural <u>you</u>.

13. identify and use the future tense of actions words (verbs).

Suggested age levels:

Age	Objectives
3	1-4
4	1-5
5, 6, 7	1-14

Appendix B-1 (cont'd)

Kinds of Materials Provided

Each of the Language and Thinking: New Directions Packages contain the following kinds of materials:

1. A procedural guidebook for teachers.

2. Appropriate manipulatives for concrete experiences for the children.

3. An audio-tape, The Let's Talk Tape Series, presents listening and participation activities with each package.

4. An array of appropropriate picture cards and transparencies.

5. Practice Test Materials.

In addition, a Picture Card Display Board and a table top felt board are included for use with the complete package series. Each guidebook has the list of materials included with introductory information for the teacher. In addition, the complete array of materials are provided here, according to package title.

Let's Start

Teacher's Objects Box

Simple Objects Transparencies - 180 pictures of objects, animals, etc., with which children should be familiar.

Let's Talk--Audio Tape

Guidebook for Teachers

Colors-Shapes-Sizes

Assembly Description

Large Section

Top-Bottom

(Left Side)

(1) Let's Talk Tape
(2) Color Objects Box
(3) Colored Pictures of Real Objects
(4) Clearly Transparencies
(5) Color Tests

(Right Side)

(1) 1 Teacher's Guidebook
(2) Empty box for Shapes Section
(3) 30 Workbooks

Shapes Section

Top-Bottom

(1) Audio-Tape for Shapes
(2) Shape-Color Transparency - Brown Envelope
(3) Shape Picture Cards: A & B
(4) Shapes Objects Box
(5) Plastic Shapes
(6) Shapes Test

Sizes Section

Top-Bottom

(1) Size Tape
(2) Size Objects Box
(3) Picture Cards for Lesson 23: (Correct and Incorrect Color Cards)
(The Shapes of Things) (Size Transparencies - 2 sets)
(4) Shape-Size Cards
(5) Opposite Size Cards
(6) Box of Picture Cards in Sizes Section
(7) Sizes Test

Directions

Guidebook
Worksheets
Pictures that tell where - Set I, II, III
Left & Right Transparency
Clearly Directions Transparency
Audio-Tape - Let's Talk
Practice Test
Building Picture Card Set
Directions Objects Box
- Doll House
- Zoo Animals
- Farm Animals
- Domestic Animals
- Plastic Animals
- Numerals (1-9)

Blends

Guidebook
Worksheets - Mini Books
Learning Lotto Games
Instructo Geometric Shapes
Blends Tape

Appendix B-1 (cont'd)

Action

Action Transparencies
Action Picture Cards
Action - Let's Talk Audio Tape
Action Sequence Puzzles
Guidebook for Teacher

Appendix B-2

TASKS ASSOCIATED WITH CONCEPT ATTAINMENT

A. Sequencing of tasks within each attribute. Examples:

1. Attribute = color, value = red; use blocks, cars, balls, etc.

2. Use other blocks in other colors to build concept of color with the value of red.

3. Present tasks requiring association; e.g. red is the color and not the name of the object. "Red is the color of the ball."

4. Present tasks requiring discrimination; e.g. present several objects and have children choose one on the basis of specific color value.

B. Sequencing of tasks as additional attributes are introduced.

1. Strategy A is used to introduce each attribute.

2. Present tasks requiring discrimination of the attributes in one class; e.g. large, red, circles.

3. Utilize knowledge to solve problems.

   a. Assimilation of a series of elements; e.g. "Find the red, round object in the box next to the label."
   b. Cause and effect relationship; e.g. "The elephant and the bird are the same size in the picture. Are they <u>really</u> the same size? Why do they look that way in the picture?"
   c. Considering alternatives; e.g. "Are all apples red? What other colors could apples be? Can you think of other places to live instead of a house?"

LANGUAGE SKILLS

A. Auditory Reception and Discrimination

1. Teacher and children identify examples of items as they are introduced. If the child doesn't have the label, it is given to him.

2. The child responds to a label; e.g. "Give me the red crayon."

3. Teacher uses complete statements; e.g. "The ball is red." (Children may just say red if asked the color of the ball.)

B. Verbal Expression

1. Use of labels introduced as a functional part of a task; e.g. If it is not a circle, what shape is it?

2. Words, phrases and statements

   a. A teacher behavior during activities.
   b. In relationship to functional tasks; e.g. use of nouns.

C. Combining of Auditory and Visual Discrimination

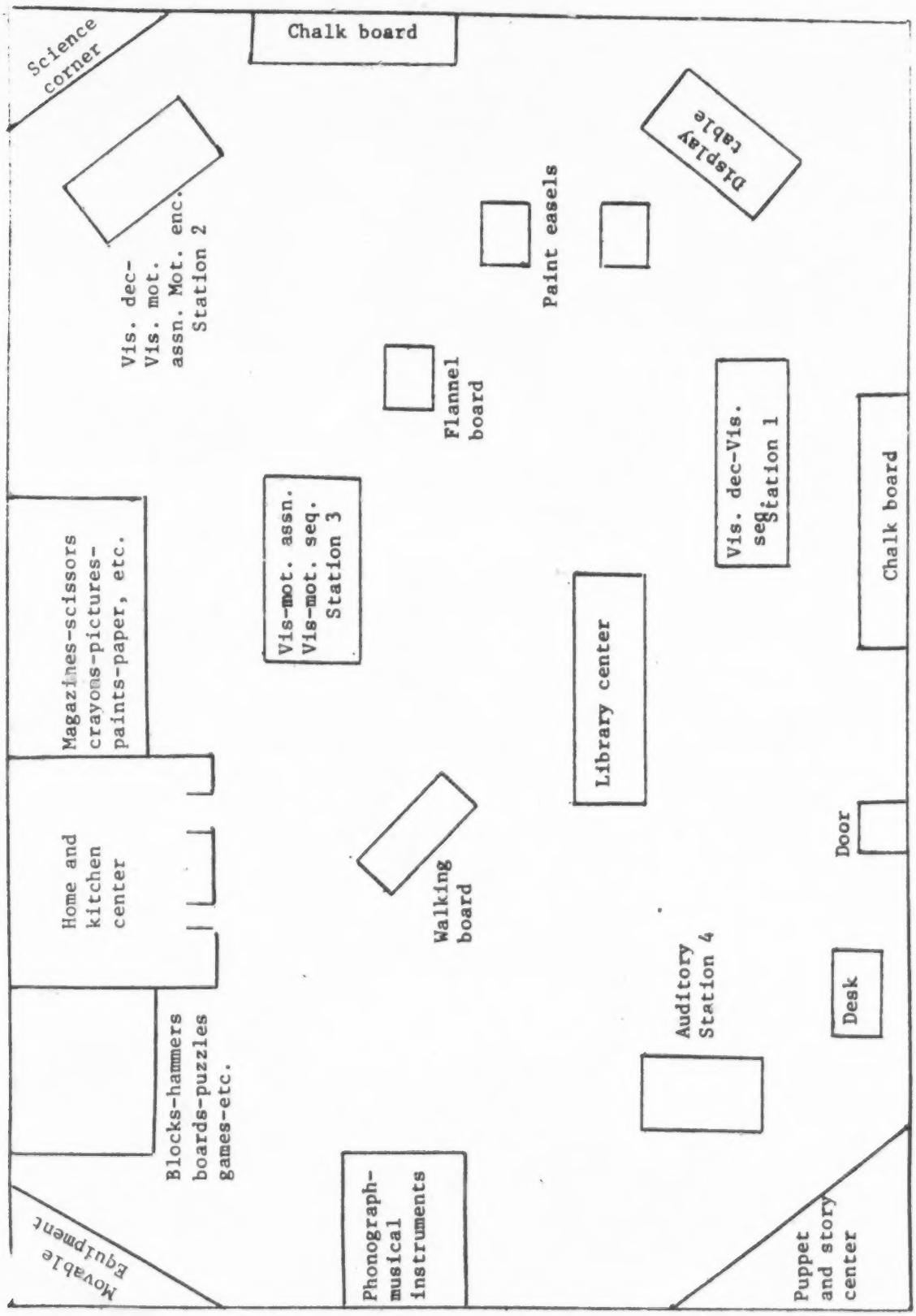
Appendix B-3

KIDI-PREP SCHEDULE

8:30 - 8:45	Roll call and sharing
8:45 - 9:00	Phonovisual activities
9:00 - 10:00	Kidi-Prep
10:00 - 10:10	Clean up and evaluation
10:10 - 10:20	Informal numbers
10:20 - 10:30	Snacktime
10:30 - 10:45	Rest
10:45 - 11:10	Physical education; music
11:10 - 11:25	Storytime
11:25 - 11:30	Dismissal

Appendix B-3 (cont'd)

Kidi-Prep Classroom



KIDI-PREP PROGRAM

Monday

RED STATION

Flannelboard game of colors

Guessing Game

One child sits on a chair and hides eyes.

Another child points to one of color objects on board.

Child in chair tries to guess which one was pointed to. -- 3 guesses

Optional Table - Clay

YELLOW STATION

1. Writing numerals from 1 to 10.
2. When paper is completed they will go to clay table and make 10 balls each.

GREEN STATION

Making a ball paper

They will make 10 balls of each color in their crayon box.

BLUE STATION Teacher directed

Lesson 1 -- Blends

Review of colors using objects in Color Object Box.

KIDI-PREP

Tuesday

Group Lesson 1 Teacher Directed

Following group lesson use Worksheet B1. 1 with entire class.

Optional Table

BLENDS

Group Lesson 2 Teacher Directed

Use overhead projector with entire class.

Drawing of colored objects with Project A Mark pens on Transparency. Teacher draws; children have a turn to draw.

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KIDI-PREP

Wednesday

Optional Table - Clay
Round Table - _____

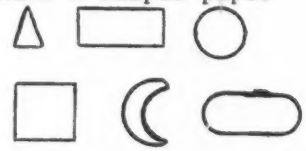
RED STATION

Use worksheet B1. 2

Play shape game on flannelboard. Guessing game as for colors described on Monday's outline (student directed).

YELLOW STATION

1. Make a Shapes paper



Shapes - write this word below drawings.

2. Go to clay table to make shapes assigned.

GREEN STATION

Make a shapes paper as posted.

5 triangles
5 rectangles
5 circles
5 squares
5 crescents

BLUE STATION

Lesson 3 Blends

Review of shapes and their identification.

Use shapes from Shapes Object Box

Teacher Directed

KIDI-PREP

Thursday

Orange Table - puzzles
Round Table -

RED STATION

Do Worksheet B1. 3

Use Color Lotto game - matching colors - hue, density, shade, etc.

Student directed

YELLOW STATION

Make following color-shape paper.

1. One red oval
2. Two blue crescents
3. Three green diamonds
4. Four orange parallelograms
5. Five purple circles

Independent

Go to puzzle table and complete a puzzle.

GREEN STATION

Trace around metal shapes with pastel pencils. Color in. Do one of each shape.

triangle
rectangle
square
oval
circle

Independent

BLUE STATION

Lesson 4 Blends — Teacher Directed

Discussion of colors using crayon boxes and slips of paper.

Use list of things suggested. Children hold up appropriate color for each one named.

ex. strawberries -- red

KIDI PREP

Friday

Orange Table - Clay
Round Table -

RED STATION

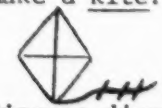
Use Worksheet Bl. 4

Play Objects Lotto Game.

Student Directed

YELLOW STATION

1. Make a kite.

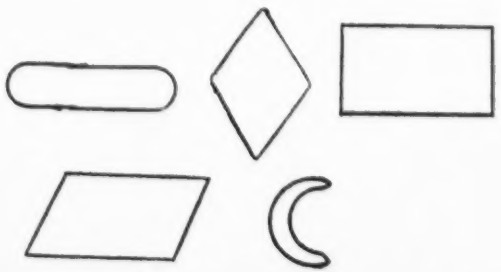


Discuss diamond shape with class. Write word on paper-underlined.

2. Go to clay table -- see how many kites they can make. Sing "My Kite" when completed.

GREEN STATION

Cut out shapes from a dittoed paper and paste on their own paper.



Independent

BLUE STATION

Lesson 5 Blends — Teacher Directed

Discussion of sides. Angles of shapes.

Use easel to demonstrate.

Appendix B-4

TRADITIONAL KINDERGARTEN SCHEDULE

8:30 - 8:45	Roll call and sharing
8:45 - 9:00	Phonovisual activities
9:00 - 10:00	Free choice activities
10:00 - 10:10	Clean up and evaluation
10:10 - 10:20	Informal numbers
10:20 - 10:30	Snacktime
10:30 - 10:45	Rest
10:45 - 11:10	Physical education; music
11:10 - 11:25	Storytime
11:25 - 11:30	Dismissal

Appendix B-4 (cont'd)

Traditional Kindergarten

Centers of Interest	Behavioral Goals
Library Center	
Books of all kinds Picture files Storybook figures Puppets Stereoptican or story-viewer Listening posts Story tapes	Develops interest in books Uses graphic materials Roleplays favorite story-book characters Improves in language facility Respects rights of others to share books and equipment Is reasonably quiet while "reading" but exchanges reactions with friends Handles books and materials properly Asks for additional books, magazines
Homemaker's Center	
Playhouse or kitchen and living room area with: dolls and doll clothes doll bed and bedding cuddly toys dishes, cooking utensils silverware telephones rocking chair soap, laundry materials, tub ironing board, iron doll carriage refrigerator stove cupboard table and chairs washline, clothes pins dress-up clothes, both male and female	Uses correct names of common kitchen equipment Shares willingly Takes turns cleaning Puts dollhouse to order Plays well with others Dramatizes familiar home roles Learns give and take Exhibits sense of family values Uses correct utensils when eating

Music Center

Record player (a manual one is best)
Piano
Rhythm sticks for each child
Rhythm band instruments

- drum
- tambourines
- jingle bells
- clogs
- sandblocks
- tone blocks
- cymbals
- triangles
- baton

Pitch pipe
Tuning fork
Materials to make "home made" instruments

- rubber bands
- bottles
- cigar boxes
- aluminum piepans
- wood blocks
- metal lids of several sizes
- metal buttons
- round cereal boxes
- small nail kegs
- innertube pieces
- water glasses
- sandpaper

Participates in some form of music
Listens to many forms of music
Interprets rhythms at times
Keeps reasonable time when using rhythm instruments
Releases emotions through music
Helps to sing
Claps or keeps time if he does not sing
Relaxes to music
Handles instruments with care
Puts instruments away when finished with them
Experiments with materials for making instruments
Hears difference in pitch, intensity
Improvises with instruments or with his body

Art Center

Easels
Crayons, wax and hard
Paste, glue
Scissors
Paints (tempera, finger, water colors)
Paper (for drawing, painting, fingerpainting)
Collage

Expresses ideas in his own way
Is self-reliant in use of materials
Participates in varying sizes of groups
Evaluates his own work and the work of others
Wants own creative efforts recognized

String
Felt
Cloth odds and ends
Paper bags, plates, cups
Paper scraps
Pipe cleaners
Spray paints
Containers for storing brushes and paints
Clay or plasticine
Enamel paints
Pieces of sponge
Screening
Wallpaper samples
Oilcloth samples
Burlap
Rolls of mural paper
Wire
Thin clothes hangers

Compliments the efforts of others
Completes projects already begun
Discusses his work with others
Varies his use of media
Knows color names
Combines several media into one product
Shares objects of "beauty"
Looks at illustrations in books
Rearranges work or play areas
Decorates objects or surrounding room areas
Shows correct care and use of tools
Assumes responsibility for cleaning up

Block Center

Large wood blocks
Cardboard blocks
Boards (8" x 4')
Assorted smaller wooden blocks
Miniature blocks

Shows a sense of proportion and design
Begins to understand principle of balance
Uses imagination and role-play

Science Center

Aquarium
Terrarium
Magnets
Prisms
Specimens
Exhibits
Animal cages and pets
Weights
Measuring spoons, cups
Watering can

Examines realia (stones, leaves, fossils, etc.)
Experiments with apparatus, materials
Finds answers for himself
Inquires about specific experiences
Brings in and shares materials, ideas
Contributes to class discussions
Cares for and feeds wild or domestic animals
Participates in group projects and experiments
Is curious about natural and man-made forces
Classifies objects and events

Social Studies Center

Globe	Use social study objects in free activity period
Maps	Asks questions about posters, maps, pictures, news items
Pictures	Brings in additional posters, pictures, news items
Posters	Tells about personal experiences connected with topic
Dolls from other lands	Begins to understand people of other times and places
Puppets	
Magazines	
Newspapers	

Audio-Visual Center

Projector	Uses less complicated audi-visual materials
Overhead projector	Shares materials
8mm. projector and cartridges	Shares interest in films, filmstrips, etc.
Small screen	Takes care of equipment
Viewmaster and reels	Discusses or asks questions about what he has seen
Stereoptican	

Wealth of equipment, although certainly a contributing factor in stimulating interest, is not a guarantee of continued growth and eagerness for learning. Other aspects of perhaps more importance have to do with what actually happens in the kindergarten:

Is there easy access to everything in the centers of interest or is the equipment so out-of-reach that no one notices it?

Is there freedom to use the equipment or do rigid rules and restrictions tend to disenchant children?

Is there TIME to explore the room or is every moment of the day structured for the class?

Is there opportunity to express ideas that develop from use of the materials and equipment?

Is there place to exhibit all the added bits and pieces that children bring if encouraged?

Is there a follow-through of "teachable moments" that spring from the children's explorations?

Appendix C

WORKSHOP FOR THE ALTOONA PROJECT

Penn-Lincoln School
August 16 - August 20, 1971

Monday, August 16

9:30 - 10:00	Orientation - Peggy Stank
10:00 - 10:30	Overview of the project - Pat Mull
10:30 - 10:45	Coffee Break
10:45 - 11:45	Discussion of Diagnostic Teaching Techniques - Dr. Emery Bliesmer
11:45 - 12:00	Question and Answer Period
12:00 - 1:30	Lunch Break
1:30 - 2:45	Discussion of the Jansky Index and the ITPA - Peggy Stank
2:45 - 3:00	Coffee Break
3:00 - 3:30	Discussion of ITPA Classroom - Profiles - Pat Mull

Tuesday, August 17

9:30 - 10:45	Use of the ITPA Profile - Pat Mull and Peggy Stank
10:45 - 11:00	Coffee Break
11:00 - 12:00	Development of a checklist for informal diagnosis - All Participants
12:00 - 1:30	Lunch
1:30 - 3:30	Introduction and Overview of Cemrel Program

Wednesday, August 18

9:30 - 10:30	Demonstration of Cemrel materials with children - Pat and Peggy and children
10:30 - 10:45	Discussion Period
10:45 - 11:00	Coffee Break
11:00 - 12:00	Examine and Discuss Cemrel Teacher Guides
12:00 - 1:30	Lunch
1:30 - 3:30	Examination of Cemrel Packages

Thursday, August 19
Flexible Time Schedule

9:30 - 3:30	Simulation of grouping procedures, scheduling and planning of activities for a typical school week

Friday, August 20

9:30 - 10:00	Summary of workshop - Peggy and Pat
10:00 - 10:30	Evaluation of the workshop
10:30 - 11:00	Questions and Answer Period
11:00 - 12:00	Explanation of report forms and schedule for classroom observations

Appendix D

February 5, 1971

The Bureau of Educational Research, Pennsylvania Department of Education, has my permission to use the Predictive Screening Index for research purposes.

Jeannette Jansky

Jeannette Jansky, Ph. D.

Appendix E

THE PENNSYLVANIA STATE UNIVERSITY

Computation Center
EXTERNAL PROGRAM

Source: Stanford Center for Research and Development for Teaching

FORTRAN IV

SCRDT1
Revised: November, 1969

REGRESSION ANALYSIS

I. GENERAL DESCRIPTION

This program provides scatterplots, descriptive statistics, and computes the regression lines for selected variable pairs. It is especially useful for comparing regression lines in several different groups as it provides an option for using the same scale for each plot, an F-ratio for testing parallelism of regression, a pooled within-groups regression coefficient, and a plot for combined groups. The program will accept data from either cards to tape.

II. OUTPUT

A. For each variable

(1) Number of cases (N)
(2) Mean
(3) Standard Deviation
(4) Variance
(5) Maximum and Minimum Values
(6) Range
(7) Skewness
(8) Kurtosis

B. For each pair of independent and dependent variables in each group.

(9) Equation of the Regression Line
(10) Standard Error of Estimate
(11) Correlation Coefficient (Pearson r)
(12) Scatter plot -- including two points on the regression line (OPTIONAL)

C. Summary of all Groups for each pair of independent and dependent variables

(13) Outputs 1-12 for total group (all groups combined). This includes a pooled regression equation and the scatter plot option.

D. Additional optional output includes:

(14) Outputs 1-13 with missing data values removed
(15) Labels for each variable

(16) Titles (names) for each group
(17) Plotting scales for each pair of independent and dependent variables
(18) F test for parallelism of regression for any combination of groups on each pair of independent and dependent variables

III. LIMITATIONS PER PROBLEM

1. Maximum number of variables is 20
2. Maximum number of cases per group is 500
3. Maximum number of groups is 30.
4. Maximum number of plots is 30

IV. CARD INPUT ORDER

A. System Cards (Job, Exec, etc see PSU write-up describing job control language and library program execution)

B. Control Cards

1. Problem card
2. Input Format card(s)
3. Title/Scale card(s) -- Optional
4. Plot card(s)
5. Groups card(s) -- optional if only one group
6. Parallel Cards -- Optional
7. Data on cards or tape

C. System Card (Slash/asterisk card)

V. CARD PREPARATION

1. Problem Card (all values right justified)

Col	1- 7	PROBLEM
Col	8	blank
Col	9	1=Each variable's scale is given for scatter plot 0=Program will supply scale
Col	10-11	Number of variables ($2 \leq v \leq 20$)
Col	12-15	Number of pairs of independent and dependent variables ($1 \leq p \leq 30$)
Col	16	1=User designated variable labels 0=Program will label variables
Col	17-18	Number of Title-Scale Cards
Col	19-22	Number of cases ($4 \leq n \leq 500$) If there is more than one group leave this field blank

Col	23-24	Number of Input Format Cards ($1 \leq f \leq 5$)
Col	25-26	Number of Plot Cards
Col	27-28	Logical number of input device (tape unit number) if other than 5. If 5 leave blank (where 5 refers to card input)
Col	29-30	Number of Parallel Cards
Col	31-62	Title of job. If there is more than one group leave this field blank
Col	63-	1 = Missing data exists 0 = No missing data exists
Col	64-69	Code for missing data (numeric). Inset decimal point Ex: 99.0 Skip if not applicable
Col	70-71	Number of groups ($1 \leq g \leq 30$)
Col	72	Scatter plot option 1 = Eliminate scatter plots 0 = Receive scatter plots

2. Input Format Card(s)

Col	1-80	Describes the format of the data which may be in either E or F specification. If the format statement exceeds the 80 columns of the card continue on additional cards (columns 23-24 of the PARAMETER card must contain the number of format cards required for the job.)

3. Title-Scale Card(s) -- Optional

If this option is used one card must be given for each variable. The order of the cards must correspond to the order of those variables (as they appear on cards or tape) which enter into the analysis.

Col	1- 5	TITLE
Col	6- 8	blank
Col	9-14	Maximum value of scale
Col	15-20	Minimum value of scale
Col	21-52	Title of variable

4. Plot Card(s)

Specified in cols. 12-15 of the Parameter card are the number of pairs (i.e., an independent and a dependent variable) of variables to be examined. The Plot card(s) identify the sequence number of the independent and dependent variable for each pair being examined. These cards are required regardless of whether or not the user has actually requested scatter plots (col. 72 of Parameter card).

Col	1- 4	PLOT

Col 5- 8 blank
Col 9-10 Independent variable of 1st pair
Col 11-12 Dependent variable of 1st pair
Col 13-14 Independent variable of 2nd pair
Col 15-16 Dependent variable of 2nd pair

. .
. .
. .

Col 77-78 Independent variable of 18th pair
Col 79-80 Dependent variable of 18th pair
Repeat for as many cards as necessary.

5. Groups Card(s)

Col 1- 6 GROUPS
Col 7- 8 blank
Col 9-11 Number of cases in group 1
Col 12-43 Title of group 1
Col 44-46 Number of cases in group 2
Col 47-78 Title of group 2
Repeat for as many cards as necessary

6. Parallel Card(s) -- Optional

A parallel card is necessary for each combination of groups that an F test for parallelism of regression is desired. Each combination will have the F test on each pair of independent and dependent variables.

Col 1- 8 PARALLEL
Col 9-10 Number of groups
Col 11-12 Sequence number of 1st group in subset
Col 13-14 Sequence number of 2nd group in subset
Col 15-16 Sequence number of 3rd group in subset

. .
. .
. .

7. Data Input Order

Data are symbolized by X_{ijk}, where i refers to each group g, j refers to each case n_i and k refers to each variable v.

Variables

	$X_{1,1,1}$	$X_{1,1,2}$	$X_{1,1,3}$	...
Case	$X_{1,2,1}$	$X_{1,2,2}$	$X_{1,2,3}$	...
	.	.	.	
	.	.	.	
	$X_{2,1,1}$	$X_{2,1,2}$	$X_{2,1,3}$	...
	$X_{2,2,1}$	$X_{2,2,2}$	$X_{2,2,3}$	...
	.	.	.	
	.	.	.	

VI. COMPUTATIONAL FORMULAE

1. Skewness γ_1

$$\gamma_{1g} = \frac{\dfrac{\sum_{i=1}^{n} (X_{gi} - \bar{X}_g)^3}{N_g}}{\left(\dfrac{\sum_{i=1}^{n} (X_{gi} - \bar{X}_g)^2}{N_g} \right)^{3/2}}$$

2. Kurtosis γ_2

$$\gamma_{2g} = \frac{\dfrac{\sum_{i=1}^{n} (X_{gi} - \bar{X}_g)^4}{N_g}}{\left[\dfrac{\sum_{i=1}^{n} (X_{gi} - \bar{X}_g)^2}{N_g} \right]^2} - 3$$

For the normal distribution $\gamma_1 = \gamma_2 = 0$

3. Standard Error of Estimate $S^2_{y.x}$

$$S^2_{y.xg} = \frac{1}{N_g - 2}\left[\sum_{i=1}^{n} Y_{gi}^2 - \frac{\left(\sum_{i=1}^{n} Y_{gi}\right)^2}{N_g} - \frac{\left(\sum_{i=1}^{n} X_{gi}Y_{gi} - \frac{\sum_{i=1}^{n} X_{gi} \sum_{i=1}^{n} Y_{gi}}{N_g}\right)^2}{\sum_{i=1}^{n} X_{gi}^2 - \frac{\left(\sum_{i=1}^{n} X_{gi}\right)^2}{N_g}}\right]$$

4. Pooled Regression Equation $y = a + b_x$

$$b = \frac{\sum_{j=1}^{g}\left[\sum_{i=1}^{n} X_{gi}Y_{gi} - \frac{\sum_{i=1}^{n} X_{gi} \sum_{i=1}^{n} Y_{gi}}{N_g}\right]_j}{\sum_{j=1}^{n}\left[\sum_{i=1}^{n} X_{gi}^2 - \frac{\left(\sum_{i=1}^{n} X_{gi}\right)^2}{N_g}\right]_j}$$

$$a = \sum_{i=1}^{g} \sum_{j=1}^{n} \frac{Y_{ij}}{N_i} - b \sum_{i=1}^{g} \sum_{j.=1}^{n} \frac{X_{ij}}{N_i}$$

5. Test for Parallelism of Regression

$$F \text{ Test} = \frac{MS \text{ (Difference of Regression)}}{MS \text{ (Combined Residual)}}$$

SS (Difference of Regression) :

$$\sum_{i=1}^{g} \frac{\left[\sum_{j=1}^{n_i} (X_{ij} - \bar{X}_i)(Y_{ij} - \bar{Y}_i)\right]^2}{\sum_{j=1}^{n_i} (X_{ij} - \bar{X}_i)^2}$$

SS (Combined Residual):

$$\sum_{i=1}^{g} \sum_{j=1}^{n_i} (Y_{ij} - \bar{Y}_i)^2 - SS \text{ (Difference of Regression)}$$

MS (Difference of Regression):

$$\frac{SS \text{ (Difference of Regression)}}{g - 1}$$

MS (Combined Residual) :

$$\frac{SS \text{ (Combined Residual)}}{\sum_{i=1}^{g} n_i \cdot - 2g}$$

VII. REFERENCES AND ACKNOWLEDGEMENTS

This program was originally written by Robert Proctor of the Stanford Center for Research and Development in Teaching, Stanford University.

It was adapted for use on the S/360 by Richard Kohr of the Center for Cooperative Research with Schools at Pennsylvania State University. This write-up was prepared by Richard Kohr.

Appendix F

The Means & Standard Deviations of Number of Times Teacher Behavior Goals in Each Activity Area Were Recorded During Observations

Teacher 1	Kidi-Prep -- N = 10		Kidi-Prep -- N = 10	
	Mean	S.D.	Mean	S.D.
Auditory				
Listening	9.55	3.62	10.70	4.31
Reception	9.33	3.26	7.11	4.25
Auditory Visual Asso.	8.66	3.26	5.10	4.50
Sequential Memory	7.77	3.25	1.30	.90
Closure	5.33	2.98	1.40	.92
Auditory Total	41.22	15.27	23.70	8.75
Visual				
Reception	8.11	2.64	3.50	3.32
Association	7.88	3.21	2.80	1.77
Sequential Memory	5.33	3.82	1.40	.92
Closure	2.55	2.91	1.00	.00
Visual Total	24.13	13.62	8.60	3.85
General				
Verbal Expression	6.60	3.09	2.80	3.54
Manual Expression	4.00	2.06	3.80	3.40
Conversation	1.00	.00	1.00	.00
Grammatic Closure	3.60	3.19	1.00	.00
Unclear	2.10	2.20	1.40	.91
General Total	17.89	6.09	10.10	5.41
Observable Pupil Responses				
No response	3.10	2.60	7.50	6.50
Verbal	32.11	19.01	9.20	9.20
Manual	16.55	13.01	12.10	12.20
Verbal Manual Integration	18.55	13.92	2.90	5.00
Total Pupil Response	68.33	29.71	31.40	12.61

Teacher 2	Kidi-Prep -- N = 10		Kidi-Prep -- N = 10	
	Mean	S.D.	Mean	S.D.
Auditory				
Listening	10.28	5.14	6.66	1.97
Reception	11.00	5.52	7.16	2.26
Auditory Visual Asso.	10.14	5.22	4.33	2.28
Sequential Memory	9.43	4.77	5.50	3.68
Closure	7.14	4.67	2.00	1.00
Auditory Total	48.57	25.71	25.00	4.93
Visual				
Reception	7.71	4.65	4.00	1.73
Association	8.00	4.54	1.83	1.06
Sequential Manual	5.71	4.89	3.00	1.53
Closure	2.14	1.88	1.16	.37
Visual Total	23.57	13.51	10.16	2.91
General				
Verbal Expression	6.00	5.01	4.00	2.38
Manual Expression	5.57	5.09	3.00	1.63
Conversation	2.87	2.09	1.00	.00
Grammatic Closure	6.28	4.74	1.00	.00
Unclear	1.00	.00	1.00	.00
General Total	20.43	11.48	10.33	3.90
Observable Pupil Responses				
No Response	1.28	.69	5.00	3.60
Verbal	25.00	19.23	16.83	8.59
Manual	25.00	24.34	9.33	6.69
Verbal Manual Integration	31.42	42.08	2.50	2.56
Total Pupil Response	83.71	47.71	33.67	7.01

Teacher 3	Kidi-Prep -- N = 10		Kidi-Prep -- N = 10	
	Mean	S.D.	Mean	S.D.
Auditory				
Listening	13.00	3.36	11.80	4.26
Reception	9.44	5.52	14.16	2.54
Auditory Visual Asso.	9.22	5.28	12.50	2.87
Sequential Memory	9.11	5.42	11.33	4.49
Closure	6.44	5.12	2.33	2.26
Auditory Total	48.11	21.97	53.16	13.68
Visual				
Reception	8.22	4.54	10.66	4.26
Association	8.22	4.54	11.33	3.59
Sequential Memory	6.66	4.49	9.16	4.81
Closure	5.22	4.87	2.43	3.49
Visual Total	27.33	16.27	32.16	13.25
General				
Verbal Expression	6.11	3.63	3.33	2.35
Manual Expression	7.22	5.34	11.83	5.01
Conversation	4.44	6.18	2.83	4.09
Grammatic Closure	3.44	3.83	1.00	.00
Unclear	4.33	6.23	1.83	1.86
General Total	26.11	7.54	20.66	8.90
Observable Pupil Responses				
No response	1.12	.33	1.33	.74
Verbal	17.22	19.48	7.06	6.19
Manual	33.90	22.33	66.16	35.52
Verbal Manual Integration	31.11	27.71	18.83	20.90
Total Pupil Responses	82.33	43.19	93.50	33.27

Teacher 4	Kidi-Prep -- N = 10		Kidi-Prep -- N = 10	
	Mean	S.D.	Mean	S.D.
Auditory				
Listening	13.50	3.72	9.16	3.53
Reception	12.09	4.01	15.14	3.89
Auditory Visual Asso.	12.09	2.01	7.83	4.14
Sequential Memory	11.90	4.07	8.33	3.94
Closure	10.81	4.40	4.83	2.11
Auditory Total	59.72	20.21	38.83	15.99
Visual				
Reception	10.36	3.84	6.33	2.29
Association	10.36	3.84	5.71	2.54
Sequential Memory	8.90	4.18	6.00	2.70
Closure	7.72	4.17	3.66	2.21
Visual Total	37.36	14.31	22.17	8.09
General				
Verbal Expression	7.27	4.99	4.00	2.31
Manual Expression	7.45	3.55	6.00	3.22
Conversation	1.00	.00	1.66	.74
Grammatic Closure	4.90	4.81	2.50	.74
Unclear	1.00	.00	1.00	.00
General Total	22.27	10.41	15.16	4.01
Observable Pupil Responses				
No response	9.72	15.84	23.70	29.67
Verbal	39.27	30.60	19.50	9.84
Manual	25.90	30.33	4.16	3.67
Verbal Manual Integration	35.63	38.02	18.15	21.03
Total Pupil Response	110.54	41.63	69.16	28.74